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Population-based randomised controlled trials to promote physical activity using a self-help print intervention

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Volume 1

Population-based Randomised Controlled Trials to Promote Physical Activity using a Self-help Print Intervention

by

Alison L. Marshall BSc (Hons)

A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

Department of Biomedical Science
University of Wollongong
Australia

2000
Declaration

I hereby certify that the material presented in this thesis titled 'Population-based Randomised Controlled Trials to Promote Physical Activity using a Self-help Print Intervention' has not been submitted for the award of any other degree or diploma in any other University or Institution. To the best of my knowledge, this thesis contains no material previously published or written by another person, except where due reference is made in the text. Copies of the original data analysed in the two studies presented in this thesis are held by the Department of Biomedical Science, University of Wollongong, NSW Australia.

Alison L Marshall
Hey baby, this one is for you Neil.
Acknowledgments

First and foremost my sincerest gratitude goes to my primary supervisor Professor Adrian Bauman (University of New South Wales), whose vision and dedication to public health research is an inspiration, to say the least. Adrian possesses an infectious enthusiasm, which helped keep me focused throughout the trials and tribulations of data collection, analyses and the final writing of this thesis. Thank you so much for being my mentor, Adrian.

Thank you also to my secondary supervisors, who provided much needed support through the more difficult times over the past 4-years, thanks to Associate Professor Linda Tapsell (University of Wollongong) and Dr Julie Steele (University of Wollongong). These women are both exceptional researchers in their respective fields and I feel privileged to have been able to work under their guidance. An extra special thank you must be awarded Julie, because without her dedication and support throughout my Honours year, I would have never applied to the Doctorate program. Professor Neville Owen, also deserves my sincere gratitude, as an unofficial supervisor he spent many hours helping me to 'tell the story'.

As well my appreciation to the team of academics who conceived the idea for this research; Professor Adrian Bauman, Professor Neville Owen, Dr Michael Booth, Assistant Professor Bess Marcus and Dr David Crawford. This team of dedicated professionals were awarded the NHF grant, which made the studies conducted as part of this thesis a possibility.

Thanks also to Mr Ben Smith who worked with me on developing the ‘Active Living’ booklets. I would also like to recognise the contribution of Mr Barry Smith a professional photographer who donated some of his fine photographs to the production of the ‘Active Living’ booklets.

I would also like to thank the residents of the Illawarra and New South Wales who allowed me to follow them up as part of my studies. Although I don’t know them personally their commitment and consent to be involved in a research study helped me enormously. Thank you also the Tracey Coles and Cathie Kiernan for the scanning and editorial advice.

A special thank you also must go to my family and friends, who kept encouraging me to be the first of them to become a ‘Doctor’. In particular, my parents Geoff and Jill Miners, although they didn’t always understand why I wanted to do such a thing, they gave me every opportunity they could. Thank you both for how you brought me up and the values you instilled in me, for I am what you taught me to be.

Last but definitely not least the biggest thank you goes to my husband Neil, whose love I couldn’t live without. You have been an integral part of all that I have achieved throughout my tertiary degrees and I will be forever grateful. Now we can get on with it!!!!
Collaboration & Funding

The author of this thesis conducted the research presented herein under the auspices of the Department of Biomedical Science, University of Wollongong.

A Community Research Grant awarded by the National Heart Foundation, to Professor Adrian Bauman, Professor Neville Owen, and Dr Michael Booth, Associate Professor Bess Marcus and Dr David Crawford, supported the studies conducted in this thesis. The grant was administered through the University of New South Wales. The aforementioned are, therefore, responsible for the original idea for conducting the evaluation trials presented in this thesis.

Contributions of the Author to this thesis

Management and all other components of the trials conducted as part of this thesis were the responsibility of the author. The author of this thesis also conducted a thorough review of related literature, along with co-ordinating regular meetings of the research grant committee and wrote reports to the funding agency (the NHF). The author also reviewed materials for developing the proposed self-help print intervention and with the assistance of collaborating student wrote and developed the ‘Active Living’ booklets. The author of this thesis also managed all phases of data collection including, the data coding, cleaning and verification, as well as all the data analyses. Interpretation of the results was also the conducted by the author. Finally the preparation of this thesis was the sole responsibility of the author.
Conference Papers

Publications in refereed conference proceedings


Abstract

Physical activity was once an obligatory part of daily life but in recent decades customary physical activity has been replaced with inactive occupational, domestic and recreational pursuits making people more sedentary in the process. Decreased physical activity levels preceded the rapid onset of many modern lifestyle diseases including cardiovascular disease, hypertension, obesity and Type II diabetes and as such physical activity is now recognised as not only a major risk factor for these diseases but an effective means of preventing illness and enhancing quality of life.

Unfortunately, the accumulating scientific evidence surrounding the benefits of physical activity has not translated into increased participation levels. Insomuch, it has been estimated that at least 20% to 30% of industrialised countries are inadequately active for health and, certainly within Australia, more needs to be done to promote physical activity to the 50% of the NSW population aged over 18-years of age who were reportedly inadequately active for health in 1994.

Clearly there is a need to develop, implement and evaluate interventions that encourage people to increase their level of physical activity. It is important to target interventions towards people who are insufficiently active, where the greatest gain in public health may be expected. One behaviour change theory, the Transtheoretical model has recently been applied to the promotion of physical activity. The key construct of the Transtheoretical Model is the Stages of Change, which may be used to determine individuals’ readiness for change. The Stages of Change also enable individualised approaches to physical activity promotion to be established within a mass-distributed intervention.

The main aim of this thesis was to examine whether a low-cost, self-help print intervention based on the Stages of Change delivered through the mail could effectively promote moderate intensity physical activity to a large sample of adults randomly selected from the community. To achieve these aims, it was first necessary to develop the low-cost, self-help, stage based print intervention. The print intervention was developed after a thorough review of existing materials and was evaluated in focus groups before being produced on mass for the proposed randomised controlled evaluation trials.
To evaluate the effectiveness of the self-help print intervention on self-reported physical activity participation in the short (2-months) and medium term (6-months), two randomised controlled trials were conducted. Study I, the Illawarra RCT, was conducted using a sample (n= 462) of adults aged between 40- and 60-years selected from residents of the Illawarra, (a regional community located in the State of New South Wales (NSW)). Study II, the NSW RCT, replicated Study I but was conducted using a larger sample (n=719) selected from residents aged between 18- and 75-years of age living in the State of NSW. All data were collected using self-report telephone interviews. Approximately 1-week post baseline, participants in both trials were stratified by Stage of Change and randomly allocated to either an intervention or control group. The randomly allocated intervention group participants were then sent the self-help print intervention through the mail. Thereafter, all study participants were followed-up at 2 and 6/8-months post baseline. Process evaluation of receipt and use of the self-help print intervention was conducted 4- to 6-weeks post baseline in the Illawarra RCT and at 2-months in both trials.

Data were analysed by Intention to Treat (ITT) and as well as Treatment Received (TR) and Treatment Received and Read (TR&R), using descriptive, bivariate, repeated measure ANOVAs and logistic regression analyses. Various definitions of adequate physical activity were applied to the data to determine the effects of the self-help print intervention, including reported time spent being physically active, the active Stages of Change and estimates of adequate energy expenditure. Furthermore, criterion estimates of adequate physical activity were also applied to the data, including accumulating at least 150-minutes of physical activity per week and an increase of at least 1-hour per week more physical activity between follow-up periods.

Both studies sustained high follow-up response rates, as well as good recognition and usage rates of the intervention materials. Significant positive results were observed in the Illawarra RCT where in comparison to the control group, the intervention group reported significant increases in time spent walking and in total physical activity per week at the 2-month follow-up. It also appeared that the intervention was particularly effective for those participants classified as inadequately active at baseline. The intervention group participants who were inadequately active at
baseline were 1.88 (95% CI = 1.13-3.13) times more likely to report at least a 1-hour increase in total physical activity between baseline and 2-months when compared to the inadequately active control group participants at baseline. In addition those participants who were least educated in the sample (<10-years formal education) were also 1.75 (95% CI = 1.05-2.94) times more likely to report the 1-hour increase between baseline and 2-months than the more educated participants in the sample. Significant progression through the Stages of Change was also observed in the Illawarra RCT between baseline and 2-months. The significance of the results was improved as the analyses focused on actual receipt (TR) and use (TR&R) of the self-help print intervention materials. These positive effects were not maintained at the 6-month follow-up assessment. However, there was a significant number of the intervention group participants who had taken the first step to increase their total physical activity by at least 1-hour at 2-months, who actually maintained that increase up to 6-months. However, the long-term effectiveness of the self-help print intervention remains questionable for those participants who do not take action in the first 2-months. Similar results were observed regardless of the analytic strategy or outcome measures used.

Unlike the Illawarra RCT, the results of the State-wide NSW RCT did not support the short-term effectiveness of the self-help print intervention. There were no significant differences between the two study groups (inadequately active participants at baseline), in terms of changes in reported physical activity, Stage of Change progression or 1-hour increases in total physical activity in the between baseline and 2-months. One interesting finding was that there was a significant number of the inadequately active intervention group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months. However, in the TR and TR&R analyses the significance of the results diminished as the analyses became more focused in terms of actual receipt and use of the intervention materials. Therefore, it appeared unlikely that the self-help print intervention was responsible for the effects observed in the ITT analyses between baseline and 8-months. Other variables such as being single, being male and reporting some intention to be more active in the future appeared to be more significant in the NSW RCT logistic regression analyses. Again these findings were consistent across analytic strategies and no intervention effect was apparent.
Both trials experienced some of the usual challenges associated with community-based research, and some of the contextual differences between the two trials may help to explain the difference observed in the main findings. For example, the seasonal effects of administering the intervention and the diversity of the sample (Regional verses State-based) that incorporated a variety of different environmental situations and conditions, may partially account for the different results between the two studies. Whilst the increases in reported physical activity in the Illawarra RCT were clinically modest, they may go some way in addressing the public health problem of inactivity in whole communities. The main findings also suggest there were some short-term benefits of implementing the intervention at a regional level, but not at the state level. Regardless, neither trial supported the role of the self-help print intervention as the sole method of promoting increased physical activity in the medium term.

The results of the present thesis are consistent with previous research, insomuch that a mass distributed self-help print intervention may be an effective strategy to promote increases in self-reported physical activity in the short-term. However, more specific ongoing support and training may be required in order to maintain actual behaviour change. To this end, the value of self-help print interventions, which have been designed, using the Stages of Change, should not be underestimated in terms their usefulness in designing individualised intervention programs.

Therefore, further research is recommended on the use of self-help print intervention materials as a method to promote physical activity in population settings, including investigation of appropriate supplementary strategies (like booster telephone calls, links to services and the potential of the World Wide Web) which may enhance the longer term effectiveness of the intervention.
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List of Definitions

The following terms are related the primary component of this thesis ‘Physical Activity’. These particular terms have been defined since epidemiological evidence regarding the benefits of participation in exercise and/or physical activity has been more categorically defined. Therefore, it is important to note the difference between exercise, physical activity and related terms.

**Physical fitness;** is a set of attributes that people have and can train to achieve that relate to the ability to perform exercise and daily physical activity (Caspersen et al. 1989), including body composition, cardiovascular endurance, flexibility, muscular strength, and muscular endurance (USDHHS, 1999).

**Exercise;** is a planned, structured form of physical activity involving repetitive body movement usually performed to improve or maintain one or more components of physical fitness (Caspersen et al. 1989).

**Physical activity;** is any bodily movement produced by skeletal muscles that results in energy expenditure (Caspersen et al. 1989).

**Physical inactivity;** is a level of physical activity less than that needed to maintain good health (NIH Consensus Statement, 1995). That is a level less than 150-minutes of moderate physical activity a week (USDHHS, 1996).

**Moderate physical activity;** is any physical activity that is requires at least 3- to 6-METs of energy expenditure or is performed at 50 to 69% of maximal heart rate, for example walking (USDHHS, 1999).

**Vigorous physical activity;** is any physical activity that is requires at more than 6-METs of energy expenditure or is performed a level greater than 70% of maximal heart rate, for example walking (USDHHS, 1999).

**Maximal heart rate;** is calculated using an aged based formula (maximal heart rate = 220 - age in years). Therefore, the maximal heart rate of a 45-year old would be (220 - 45 = 175-beats per minute). The target heart rate is percentage of this maximal heart rate (USDHHS, 1999).
MET (metabolic equivalent); is a unit used to measure the metabolic cost or oxygen consumption associated with physical activity. One MET is the resting metabolic rate which is estimated to be equal to 3.5 ml O² kg⁻¹ min⁻¹. Therefore as the intensity of activity increases so does the MET score (USDHHS, 1999).

Outcome measures of physical activity used in this thesis

Adequate physical activity; is defined as a level of physical activity that results in more than 800-kcal of energy being expended from physical activity per week (Bauman, Bellew et al., 1996). This outcome is based the U.S Surgeon Generals recommendation of adequate energy expenditure (USDHHS, 1996). The samples are therefore divided into adequate and inadequate physical activity categories.

Criterion of 150-minutes physical activity per week; is an estimate of physical activity derived form the current recommendation for moderate physical activity, ‘at least 30 minutes on most days of the week’ (USDHHS, 1996). Most days of the week was taken as 5 out of 7 and when multiplied by 30, equates to at least 150 minutes per week.

Stage Progression; defined as positive movement through the Transtheoretical Models’ Stages of Change (eg., movement from Pre-contemplation to Contemplation is considered to be a positive change).

Stage Change from Inactive to Active Stages of Change; refers to the dichotomous categorisation of the Inactive Stages (Pre-contemplation, Contemplation and Preparation or those people who are not yet undertaking the recommended amounts of physical activity on a regular basis) and the Active Stages of Change (Action and Maintenance, including those who are regularly active). This is an important categorisation, as a key aspect of the current recommendations for physical activity is regularity. These categories and the movement between them enable the distinction of regularity to be evaluated.

Stage Change from Sedentary to Active Stages of Change; refers to the dichotomous categorisation of the Sedentary Stages (Pre-contemplation and Contemplation or those people who are not doing any physical activity at all) and the Active Stages of Change (Preparation, Action and Maintenance, including those who
do at least some physical activity). This is also an important categorisation, particularly in terms of defining the initial steps toward increasing physical activity. By definition in the Stages of Change people who initially present in Pre-contemplation and Contemplation should initially progress to Preparation, hence their stage change would be obscured by the previous categorisations as they may not be doing enough physical activity to jump the threshold to regular activity (Action and Maintenance), rather simply into Preparation. This is an important categorisation especially for determining the initial effects of an stage-based intervention.

**At least 1-hour increase in physical activity per week;** this outcome measure is an extension of the Sedentary Stage Change category, whereby inactive people who have increased their total physical activity by at least 1-hour per week are considered to have made a positive change worth noting.
List of Abbreviations

The following abbreviations are used within this thesis.

RCT: Randomised Controlled Trial

NSW: New South Wales

NHF: National Heart Foundation

U.S.: United States of America

USDHHS: U.S. Department of Health and Human Services

NH&MRC: National Health and Medical Research Council

IPAP: Illawarra Physical Activity Project

ITT: Intention to Treat

TR: Treatment Received

TR&R: Treatment Received and Read

BMI: Body Mass Index
1. The Problem

1.1 Introduction to the problem

Being physically active used to be a necessary way of life, where humans were once forced to gather, cultivate and/or hunt for food for survival. Since the industrial revolution we now have relatively sedentary ways of life due to automation, urbanisation, and computerisation (U.S Department of Health and Human Services (USDHHS), 1995; Blair, Kohl et al., 1992). Traditional work-place and leisure time activities have been replaced by labour saving devices, such as lifts replacing stairs and computer games being used for recreation. Where physical activity was once an obligatory part of daily living it is now considered an extraordinary aspect separate from other daily tasks, which is often ignored in pursuit of competing interests. Not surprisingly then, there has been a significant decline in our daily energy expenditure (Sallis et al., 1998). Cordain et al. (1998) estimated that people today expend only 44% of the total energy expended by our ancestors during the hunting and gathering era. This decrease in energy expenditure has been linked to the rapid onset of many modern lifestyle diseases, like cardiovascular disease, Type II diabetes and some cancers (USDHHS, 1995). Within Australia, over 44% of all adult mortalities in New South Wales were due to cardiovascular disease (NSW Health, 1990; Bauman et al., 1996). As a risk factor for cardiovascular disease, physical inactivity is also related to other causal risk factors of the disease such as, hypertension, adverse blood lipid profiles and overweight (Haskell et al., 1992).

Moderate physical activity is now recommended as an effective approach to preventing most modern lifestyle diseases (USDHSS, 1996; Pate et al., 1995). Up until the 1990’s it was believed that vigorous activities performed at 75% to 85% of maximum heart rate (eg., jogging) was the key to preventing ill health. However, one large study of middle aged men showed that men who were active at a moderate level (60% to 70% of maximum heart rate) were significantly less likely to suffer
from coronary heart disease compared to men who were active at a low level (Leon et al., 1991).

Since then evidence has accumulated supporting the benefits of moderate physical activity in preventing all-cause mortality (Blair et al., 1995). Moderate physical activity includes activities performed up to 60% of maximum heart-rate which may include such as walking, heavy gardening, leisure swimming and cycling. All of these activities may preserve and/or enhance health, when performed on a regular basis.

Based on evidence accumulated from over 40-years of scientific research involving observational and clinical trials, as well as cohort studies the American College of Sports Medicine and the U.S Centre for Disease Control appointed an expert panel (Pate et al., 1995) to revise the then current physical activity recommendations. In summary the new recommendation stated, “All U.S adults should perform 30- or more minutes of moderate physical activity on most, preferably all, days of the week” (Pate et al., 1995, p. 402). The USDHHS (1995) added, “... either as a single session or ‘accumulated’ in multiple bouts, each lasting at least 8- to 10-minutes” (USDHHS, 1995, p. 5).

The current recommendation still values participation in vigorous physical activity, as there are additional fitness benefits that can be accrued from participation in activity at this level (USDHHS, 1995). Moderate physical activity provides similar health related benefits to more vigorous physical activity, but is a more achievable, attractive level of physical activity which may be enjoyed by the majority of the population.

Unfortunately, the accumulating scientific evidence surrounding the benefits of moderate physical activity has not yet translated into increased participation levels. In the U.S, four National Surveillance Programs documented that one in four adults were sedentary, participating in no leisure time physical activity at all (NIH Consensus Statement, 1995). Similar data exist for most industrialised countries, where it has been estimated that at least 20% to 30% of western populations are inadequately active for health (Sallis & Owen, 1999; NIH Consensus Statement, 1995; Blair et al., 1994).
Within Australia in 1994 over 50% of the NSW population aged over 18-years of age were classified as inadequately active for health, and of these people 13% were sedentary (reporting no leisure time physical activity at all; Bauman, Bellew et al., 1996). More importantly older people (aged over 40-years) were 51% more likely to be sedentary than those people aged between 18- and 29-years of age (Bauman, Bellew et al., 1996). It has been estimated that if 1% of the current sedentary population (estimated to be 51% of the New South Wales (NSW) adult population in 1994 (Bauman, Bellew et al., 1996)) were encouraged to participate in regular moderate physical activity at least 122 deaths from coronary heart disease, type II diabetes and colon cancer could be avoided each year (Stephenson et al., 2000). Furthermore, an estimated $3.6 million p.a could be saved each year in health care costs associated with the three aforementioned diseases for each 1% gain in the proportion of adequately active people in the population (Stephenson et al., 2000). This saving may be facilitated by increasing the total energy expenditure from physical activity across whole communities (Bauman & Egger, 2000), since small increases in physical activity in large sections of the population would make an important contribution to lowering disease costs associated with a lack of physical activity (Arrol & Swinburn, 1994) especially from a public health perspective.

Clearly scientific evidence supports the need to develop, implement and evaluate intervention strategies, which would encourage the population to increase participation in moderate physical activity up to recommended levels. Until recently research surrounding the promotion of physical activity was limited to intervention programs aimed at individuals and small groups most of which tend to attract the already active people. However, it is important to target interventions towards people and communities who are inadequately active, where the greatest gain in public health may be achieved.

Individualised assessments and programs delivered face-to-face have been effective using relatively small segments of the population (King et al., 1992). Other strategies have used the expertise of physicians and general practitioners to promote physical activity to patients. These programs have been shown to be moderately effective in the short term (Calfas et al., 1996), but are reliant on people visiting their physician. More recent investigations have based the interventions on increasing
incidental lifestyle physical activity (Dunn, Blair et al., 1997). Results of these trials have reported participants demonstrated a 10% increase in overall fitness, which was equivalent to the increases demonstrated by participants completing a structured exercise program (Dunn, Blair et al., 1997). However, there are some limitations of effective interventions reported to date, in that they are conducted on a relatively small scale with the intervention strategies (face to face assessment and instruction) not readily generalisable to whole populations, and as well the research has often been conducted using volunteer participants.

Interventions that have the potential to be implemented on a large-scale to influence whole populations and settings have recently been investigated. Large-scale mass media campaigns have been shown to be effective in increasing awareness of appropriate physical activity messages, but have limited potential to support real behaviour change, particularly in the sedentary sections of the community (see Section 2.6.2.3). Studies have also been conducted in a variety of institutional settings such as work-sites and schools (see Section 2.6.2.1). The main advantage of evaluating programs in institutions is that successful components of the intervention might then be transferred to community or population settings. Environmental manipulation strategies also have the potential to influence large sections of the population, by affecting the choices people make (see Section 2.6.2.4). However, once again most physical activity promotion initiatives aimed at larger samples have also relied on data collected from volunteer samples and/or results are compromised by weak study designs (Dishman et al., 1998). The environment or setting in which the investigation has takes place, and/or the short term effects once the intervention is removed often limits interventions conducted in closed settings. Nevertheless, these physical activity interventions have provided valuable insights into the usefulness of behavioural skills training as a complimentary component to the traditional health educational approaches. The more successful interventions have used broad-based approaches, including both educational and behavioural change support strategies.

Home-based self-instructional programs have recently become the focus of some investigators, since it became apparent that most people actually prefer to be active on their own terms, at times and locations convenient to them (Booth et al., 1997).
Conventional home-based programs often begin with an initial fitness assessment and face to face consultation followed by repeated visits for re-assessment of fitness parameters and/or ongoing telephone support for encouragement (King, 1994) (see Section 2.6.2.5). Therefore, these home-based programs tend to involve intensive counselling and lengthy measurement methods, which may not be readily transferred beyond the volunteer samples used to evaluate them.

Based on the successes of home-based interventions the use of self-help interventions to promote physical activity was investigated. Initial trials using a single mailing of a printed self-help physical activity course resulted in short term increases in physical activity (Owen et al., 1987). More recent attempts at promoting physical activity using self-help print materials have adopted one behaviour change model, the Transtheoretical model (TTM) initially developed by Prochaska & DiClemente (1982) to better understand, motivate and support smoking cessation. The TTM involves identifying the Stages of Change associated with behaviour change. The five stages are Pre-contemplation, Contemplation, Preparation, Action, and Maintenance. Each stage encompasses varying degrees of motivation and readiness to change behaviour. Those in the early stages (Pre-contemplation and Contemplation) may not be ready for change and simply require education and support to help them realise the importance of changing their behaviour. Those in the middle stage (Preparation) require a different kind of support, including behavioural strategies to help them engage in the new behaviour. Whereas, those in the higher stages (Action and Maintenance), who have already changed their behaviour, need support and encouragement in terms of relapse prevention to maintain their new behaviour to make it an ‘all of life’ behaviour. The Stages of Change may be used to design and aid in the delivery of an intervention targeting the needs of the individual (see Section 2.7).

The main difference between traditional intervention strategies and the Stages of Change strategy is that traditional strategies usually take an action orientated approach, using strategies aimed at people who would be in the Preparation stage or higher. The problem arises in that many people with a problem behaviour may be staged between the Pre-contemplation and Preparation stages and, therefore, are not ready for the action orientated advice traditionally given. Furthermore, these people
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often become discontented and fail to change their behaviour or drop out of the program when confronted by the action-orientated approach. Prochaska et al. (1992) reported that the success generated from an action orientated program is largely dependent on the pre-treatment Stage of Change, with people in higher Stages of Change being most successful at changing as they are more ready for making long term change. Therefore, interventions need to be designed including the early Stages of Change, to help people gradually progress toward the higher stages in the model.

Over the past decade Marcus and colleagues have used the Stages of Change to guide physical activity promotion. They have evaluated various components of the model (Marcus, Selby et al., 1992; Marcus, Rossi et al., 1992; Marcus & Owen, 1992; Marcus & Simkin, 1993, 1994; Marcus et al., 1994; Marcus, 1995), including the evaluation of self-help print interventions in both work-site and community settings (Marcus, Banspach et al., 1992; Marcus & Stanton, 1993; Marcus, Simkin et al., 1996; Marcus, Goldstein et al., 1997; Marcus, Emmons et al., 1997). The self-help print interventions were shown to be effective in supporting increases in physical activity (Marcus, Banspach et al., 1992; Marcus, Emmons et al., 1997). In a more recent study Marcus Bock et al. (1998) used a mail-based dissemination strategy and reported that the self-help materials (which were also based on the Stages of Change) were more effective in promoting physical activity than the standard information booklets produced by the American Heart Association. However, these studies relied on volunteers (who may have had a pre-conceived agenda for enrolling in the study regardless of the intervention) or were conducted in work-sites in the U.S. Thus, no prospective randomised controlled trial using a similar low-cost, mail delivered, self-help print intervention to promote moderate physical activity to randomly selected community samples, was identified. Therefore, a more rigorous evaluation of such self-help print interventions was warranted, and indeed considered necessary by Marcus, Owen et al. (1998). Information derived from such an evaluation would provide valuable information to help guide future community-wide physical activity interventions. If effective, population level interventions may be incorporated into the future planning of public health approaches to physical activity promotion they may help to reduce the burden inactivity is placing on population health around the world.
1.2 Statement of the problem

The main aim of this thesis was to examine whether a low-cost, self-help print intervention delivered through the mail aimed at promoting moderate physical activity could effectively increase the physical activity levels of groups of people randomly sampled from the community.

To achieve this aim it was first necessary to develop the low-cost, self-help print intervention. Thereafter, to evaluate the effects of the self-help print intervention delivered through the mail on self-reported physical activity participation in the short (2-months) and medium term (6-months), two randomised controlled trials (RCT) were conducted. Study I, the Illawarra RCT was conducted using a sample selected from residents of a regional community the Illawarra, (located within the state of New South Wales (NSW). Study II, the NSW RCT, was conducted using a larger State-wide sample selected from residents of NSW as a replication study.

1.3 Potential significance of solving the problem

Physical inactivity is a major public health concern, and evaluation of effective physical activity promotion interventions suitable for population-wide dissemination need to be evaluated in the setting in which they were designed for and where they have the potential to have the greatest impact. Mailed interventions have the potential to reach large numbers of people, with relatively little outlay in terms of human resource and administration costs, compared to other methods and personal face-to-face counselling. Evaluation of a mailed self-help print intervention aimed at educating the community on appropriate amounts and types of physical activity and methods on how to become more active is expected to increase readiness to adopt a physically active lifestyle as well as increase participation levels in those people who are irregularly active. The success of such an intervention would provide an effective low-cost, generalisable strategy that may be broadly implemented to promote physical activity at the population level. This has the potential to reduce physical inactivity related health concerns such as cardio-vascular disease, type II diabetes, hypertension and all-cause mortality while lessening the burden of ongoing health care costs associated with these lifestyle diseases.
1.4 Limitations and delimitations

1.4.1 Limitations

The following are acknowledged as limitations to the two studies conducted in this thesis:

1. Data were collected by self-report telephone surveys’ as this was the most cost-effective method of data collection with large samples.

2. Data collection for both studies may have been affected by seasonal variation as the follow-up telephone surveys were conducted across three seasons over the follow-up period of 6-months (Study I: Spring, Summer, Autumn; Study II: Autumn, Winter, Spring).

3. The samples in both studies (despite being selected from the Electronic White pages) consisted of people who were sufficiently motivated to consent to being re-contacted by telephone. Therefore, they do not represent true random sample of the population, despite being a close manifestation of it. This problem was partially overcome by random allocation into the intervention and control groups in the study design (see Section 5.1 and Section 8.1), and the fact that the samples remained comparable to the general population (see Section 6.1 and Section 9.1).

4. The survey questions used in Study I and Study II were different as the initial random selection and were commissioned by different organisations and reflect the most appropriate questions available at the time of the surveys were conducted. In Study I the initial random sample was selected

* Nonetheless, this is consistent with National and International approaches to physical activity surveillance, so this mode of measurement is not necessarily a weakness.

† This too may not necessarily be a limitation, but a purposive component of the research question asked – as different seasons were tested in Study 2.

‡ It is important to note that the author of this thesis was not involved in designing the physical activity questions used in the original surveys for both studies as they were selected from the most valid and reliable questions available at the time by the organizations that originally collected the data. The author of this thesis was, however, satisfied that the questions were indeed valid and reliable (see Section 5.3 and Section 8.3) and the author incorporated other questions into the intervention focused surveys to evaluate other aspects of the intervention.
on behalf of the NHF Illawarra Physical Activity Project in November 1995. In Study II the initial random sample was selected on behalf of the NSW Health Department and the Australian Sports Commission in November 1997.

5. Data were collected from adult Australians aged between 18- and 75-years of age. Therefore, results may not be generalisable to children and adolescents or to adults aged over 75-years, nor may the results be generalisable to other countries around the world.

1.4.2 Delimitations

The following are acknowledged as delimitations to the studies conducted:

1. Study I participants were limited to adults aged between 40- and 60-years of age living in the Illawarra region. Study II participants were limited to adults aged between 18- and 75-years of age living within the State of NSW. Therefore, the results from either study may not be generalised to minority groups, and other state populations within Australia or overseas. Nonetheless, the randomisation protocol employed in both studies will give the best indication of the potential effectiveness of this type of intervention.

2. Data were collected using self-report telephone surveys as this method was considered to be the;

i. least invasive method in terms of participants time and commitment,

ii. method least likely to have an intervention effect on participants,

iii. method most appropriate to collecting large amounts of data from large samples,

iv. most cost effective data collection method available for collecting data regarding physical activity from large population samples.
1.5 Hypotheses

Based on previous research, the following hypotheses were developed for both Study I and Study II.

1. After receiving the self-help print intervention in the mail those in the Intervention group would;
   a. increase their time spent walking,
   b. increase their time spent participating in moderate physical activity,
   c. not change their time spent participating in vigorous physical activity, and
   d. increase their total physical activity time,
   per week between Baseline and 2-months and between Baseline and 6-months, compared to the control group whose activity levels would not significantly change.

2. After receiving the self-help print intervention in the mail, more of the Intervention group would be meeting a criterion of sufficient physical activity, of at least 150-minutes of physical activity per week (Bauman & Egger, 2000) than the control group at both the 2- and 6-month follow-up.

3. After receiving the self-help print intervention in the mail, the Intervention group would have significantly more participants expending adequate amounts of energy (>800kcal per week) through increased physical activity at the 2- and 6-month follow-ups, compared to the control group whose energy expenditure levels would not significantly increase.

4. After receiving the self-help print intervention in the mail the Intervention group would demonstrate significantly more;
   a. stage progression (movement in a positive direction through the Stages of Change), between Baseline and the 2-month follow-up, compared to the control group whose Stage of Change would remain relatively stable.
   b. categorical stage change from inactive stages (Pre-contemplation, Contemplation and Preparation) to the more active stages (Action and
Introduction

Maintenance), compared to the control group whose Stage of Change would remain relatively stable.

c. alternate categorical stage change from sedentary stages (Pre-contemplation and Contemplation) to the more active stages (Preparation, Action and Maintenance), compared to the control group whose Stage of Change would remain relatively stable.

5. After receiving the self-help print intervention in the mail;

a. more of the inadequately active Intervention group participants at Baseline (classified by inadequate energy expenditure) would show at least a 1-hour increase in total physical activity per week between Baseline and 2-months, than the inadequately active control group participants at Baseline.

b. more of the inadequately active Intervention group participants at Baseline (classified by inadequate energy expenditure) would show at least a 1-hour increase in total physical activity per week between Baseline and 6-months, than the inadequately active control group participants at Baseline.

6. After receiving the self-help print intervention in the mail more of the Intervention group participants who report an initial 1-hour increase in total physical activity at 2-months will actually maintain that increase up to 6-months, as compared to the control group.

1.6 Terminology and definitions

Physical activity can be defined in many ways using different terms. For this reason the commonly used terms in this thesis were defined in the front section of this thesis (see List of Definitions, page xxxiii). In addition the commonly used abbreviations are also listed in front section of the thesis (see List of Abbreviations, page xxxvi).
1.7 **Organisation of the thesis**

This thesis is presented in two volumes, Volume 1 is divided into the following four Sections.

Section A provides the framework upon which the studies presented in this thesis were based. Chapter 1 provides a brief introduction to the problem, states the significance of solving the problem and presents the general hypotheses addressed in this thesis. Chapter 2 describes the literature related to the problem, including the benefits of physical activity, current recommendations for physical activity and a summary of different intervention strategies. Chapter 3 describes the development and formative evaluation of the self-help, print intervention. Chapter 4 concludes Section A by describing appropriate community intervention research methodologies.

Section B describes information pertaining to Study I, the Illawarra Randomised Controlled Trial. Chapter 5 reports the methods specific to conducting the Illawarra trial. Chapter 6 presents the results, whilst Chapter 7 presents a summary of the Illawarra RCT results in relation to the hypotheses set at the beginning of the thesis as well as the rationale for conducting the second study.

Section C describes information pertaining to Study II, the New South Wales Randomised Controlled Trial. This section is divided into Chapter 8, the methods specific to the New South Wales Trial. Chapter 9 presents and describe results of the NSW trial, whilst Chapter 10 provides a summary of the results in relation to the hypotheses set at the beginning of the thesis.

Section D, Chapter 11 presents an overall discussion of the results of both the Illawarra and New South Wales Randomised Controlled Trials in relation to each other and previous research. Recommendations and opportunities for future community-based physical activity interventions are also presented.

A list of all the references used in this thesis is presented at the end of Volume 1.

Volume 2 contains the appendices to Volume 1. The appendices include a complimentary literature review section, items used to formatively evaluate the self-help print intervention and the surveys administered during the evaluation of the self-help print intervention. The remaining appendices include an analysis of the Illawarra cohort and other supplementary results which compliment and complete the results chapters presented in Volume 1.
2. Literature Review

2.1 Introduction

Many illnesses and disabilities present in old age are a direct result of habitual inactivity throughout life rather than due to the aging process itself. Sedentary lifestyles are now so common that it is estimated that approximately 200,000 deaths in the U.S annually may be attributed to physical inactivity, making sedentariness one of the leading causes of death (Sallis & Owen, 1999). As such, sedentariness has become recognised as one of the major concerns of the public health system. Therefore, promoting physical activity has become a priority to reduce premature death and health care costs associated with chronic lifestyle diseases and to enhance overall quality of life.

Within Australia, it has been estimated that if 1% of the current sedentary population (estimated to be 51% of the New South Wales (NSW) adult population in 1994 (Bauman, Bellew et al., 1996)) were encouraged to participate in regular moderate physical activity at least 122 deaths from coronary heart disease, type II diabetes and colon cancer could be avoided each year (Stephenson et al., 2000). Furthermore, an estimated $3.6 million p.a could be saved each year in health care costs associated with the three aforementioned diseases for each 1% gain in the proportion of adequately active people in the population (Stephenson et al., 2000). Clearly there is a need to develop appropriate intervention strategies to promote an active lifestyle, and hence reap the benefits physical activity has to offer in terms of personal, public and economic gain.

Literature pertaining to the following sections:

1. the health benefits of physical activity,
2. the current physical activity recommendations,
3. physical activity as a public health goal,
4. the prevalence of physical activity and inactivity in Australia,
5. physical activity interventions,
6. tailoring self-help print interventions, and
7. effective components of previous interventions,

were reviewed in order to gain a better understanding of the role of physical activity and possible intervention strategies.
2.2 Health benefits of physical activity

Regular physical activity has much to offer the population in terms of health gain and disease prevention. Physical activity has been shown to reduce the risk of all-cause mortality by more than 25% (Ross & Pate, 1987). The benefits of physical activity may be accumulated from expending energy doing any activity including activities of daily living and domestic chores. Epidemiological evidence supporting the protective effects physical activity has over many chronic lifestyle diseases (such as coronary heart disease, hypertension, Type 2 diabetes mellitus, stroke, osteoporosis, colon cancer, and depression) has been consistently reported across various populations and settings, with the better designed studies showing the greatest protective effects (Pate et al., 1995). Overall, the relative risk of ill health has been reported to be 1.5 to 2.4 times more likely in less active individuals compared to active counterparts (Pate et al., 1995).

Life expectancy has been shown to increase by more than 2-years above the population average in those people who participate in physical activity (Pekkanen et al., 1987). One study examining the effects physical activity and smoking had on life expectancy categorised people in low, moderate or high physical activity categories. This study showed that as the peoples’ activity category increased, significantly more years of life expectancy were observed regardless of smoking status (life expectancy increased by 9.5-, 10.5-, and 12.9-years in men, and 11.1-, 12.6-, and 15.3-years in women aged over 65-years who smoked and increased by 11.0-, 14.4-, and 16.2-years in men, and 12.7-, 16.2-, and 18.4-years in women aged over 65-years who did not smoke; Ferrucci et al., 1999). Therefore, regardless of smoking status physical activity displayed a protective effect over life expectancy and was also associated with fewer years of disability prior to death (Ferrucci et al., 1999).

Several comprehensive reviews on the benefits associated with participation in physical activity have been conducted (Bauman & Owen, 1999; Sallis & Owen, 1999; Bauman, Bellew et al., 1996; Bauman, Brown et al., 1996; USDHHS, 1996; Fentem, 1994), thus, an exhaustive review will not be repeated here, rather a summary of reported health benefits associated with physical activity is presented in Table 2.1.

Despite the extensive evidence surrounding the benefits of physical activity, the role of physical activity in disease prevention and health promotion has been under
recognised compared to other modifiable health risks (Bauman & Owen, 1999). The challenge is to translate the knowledge of the benefits associated with physical activity to a working disease prevention model through physical activity interventions.

2.2.1 Risks associated with physical activity

While the benefits of being physically active far outweigh the risks (USDHHS, 1996), the risks should not be ignored. Different types and intensities of physical activity are associated with different benefits and risks (Sallis & Owen, 1999; Haskell, 1994). There are two main types of risk involved with physical activity (i) musculoskeletal injury and (ii) acute cardiovascular events (Bauman & Owen, 1999). Numerous musculoskeletal injuries occur during participation in high intensity activities such as jogging, aerobics (Sallis & Owen, 1999) and competitive sports (Bauman & Owen, 1999). Cardiovascular events are relatively uncommon, but can occur during participation in vigorous physical activity. However, the low risk of such an event occurring during physical activity is outweighed by the numerous benefits that may be accumulated from long-term participation including the overall reduced risk of a coronary event (Bauman & Owen, 1999; Siscovik et al., 1984).

Other problems such as dehydration, hypothermia, amenorrhoea in women, anaemia and depressed immune function can also occur in highly active individuals (Sallis & Owen, 1999), and the risk of asthma attacks is increased during physical activity in those people who are susceptible (USDHHS, 1996).

It is important to note however, the risks discussed above rarely occur from participating in moderate physical activity*. Powel et al. (1998) reported that the frequency of injuries from moderately intense activities such as walking, yardwork, weightlifting, bicycling, and aerobics were quite low, ranging from 0.9% to 2.4%, over 30 days.

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* Moderate physical activity is activity performed at an intensity equivalent of walking at a brisk pace (or 3 to 4 mph) for most healthy adults.
<table>
<thead>
<tr>
<th>Benefits</th>
<th>Relationship</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause mortality</td>
<td>• Dose-response relationship: increased physical activity results in greater protection</td>
<td>• Lee &amp; Paffenbarger, 1996; Blair, Kampert et al., 1996; Blair, 1995; Linsted, 1991.</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>• Primary and secondary prevention role • Dose-response relationship • 1.5 to 2 fold increased risk if sedentary</td>
<td>• USDHHS, 1996; 1996; Haskell, 1994; Young &amp; Steinhardt, 1993; Haskell et al., 1992; Berlin &amp; Colditz, 1990; Blair, Kohl et al., 1989; Leon et al., 1987; Powell et al., 1987; Paffenbarger et al., 1986; Shapiro et al., 1969.</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>• Reduced risk of developing hypertension and lowers existing hypertension levels</td>
<td>• USDHHS, 1996; Kelley &amp; McClellan, 1994; Reaven et al., 1991; Folometal, 1990; Blair, Goodyear et al., 1984; Paffenbarger et al., 1983.</td>
</tr>
<tr>
<td>HDL/Cholesterol/triglycerides</td>
<td>• Reduced circulating HDLs &amp; triglycerides, therefore, impacting upon cholesterol</td>
<td>• Stefanick &amp; Wood, 1994; Durstine &amp; Haskell, 1994.</td>
</tr>
<tr>
<td>Type 2 Diabetes</td>
<td>• Primary prevention and control • Decrease risk 15% to 25% • Possible dose-response relationship</td>
<td>• Hu et al., 1999; Bauman &amp; Owen, 1999; Kahn et al., 1997; Powell &amp; Blair, 1994; Blair et al., 1992; Manson et al., 1992; Helmrich et al., (1991); Manson et al., 1991.</td>
</tr>
<tr>
<td>Obesity</td>
<td>• Reduced incidence</td>
<td>• Kahn et al., 1997; Williamson et al., 1993.</td>
</tr>
<tr>
<td>Cancers</td>
<td>• Decreased risk of colon cancer • Reduced risk of breast cancer (up to 30%) • Marginally reduced risk of prostate cancer • Reduced risk of lung cancer</td>
<td>• Lee, 1995; Blair et al., 1992; Oettle, 1991.</td>
</tr>
<tr>
<td>Musculoskeletal health</td>
<td>• Increased muscle strength, joint function motor control • Therapeutic benefits for osteoarthritis sufferers</td>
<td>• Thune, 1997; Lee, 1995; Bernstein et al., 1994; Blair et al., 1992.</td>
</tr>
<tr>
<td>Psycho-social health</td>
<td>• Enhanced mood &amp; self esteem • Reduced anxiety and depression</td>
<td>• Cerhan, 1997; Lee et al., 1992.</td>
</tr>
<tr>
<td></td>
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<td>• Thune &amp; Lund, 1997.</td>
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<tr>
<td></td>
<td></td>
<td>• Chillibeck et al., 1995; Bassey &amp; Harries, 1993; Brown &amp; Hollszy, 1993; Wagner &amp; LaCroix, 1992; Bassey et al., 1988.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bauran &amp; Owen, 1999.</td>
</tr>
</tbody>
</table>
They further reported that almost half the injuries reported did not result in decreased ability to participate or require medical attention, such that participating in moderate physical activities should be encouraged (Powel et al., 1998).

2.3 Current physical activity recommendations

Until recently the amount of physical activity or exercise recommended was the same regardless of whether the intended outcome was improved fitness or better health (Oja, 1995). The original American College of Sports Medicine (ACSM) recommendations for exercise which were developed in 1975 (ACSM 1991), have evolved over the last three decades from the fundamental Frequency, Intensity, Time and Type (FITT) formula* (ACSM, 1990) to recognise the value of moderate intensity physical activity in the preventing cardiovascular disease and all-cause mortality (USDHHS, 1996; Blair et al., 1996; Blair et al., 1995). The FITT formula remains a valid basis for developing aerobic fitness and enhancing physical performance, but until recently was also used to prescribe activity to people who wanted to improve their health status (Harris et al., 1989).

The development of moderate intensity physical activity guidelines was been based on years of scientific research that clearly demonstrated regular, moderate physical activity can provide substantial health benefits. It has been repeatedly shown that the maximum benefit occurs when the least physically active group become moderately active (Pate et al., 1995), with diminishing returns in risk reduction as people move from being moderately active to vigorously active (Blair, Booth et al., 1996). Therefore, it appears that the greatest benefit for reducing societies' weakness for preventable disease would be to get the current sedentary proportion of the population to be moderately active (Blair, Booth et al., 1996).

* The FITT formula is as follows; Frequency: 3 to 5 times per week, Intensity: 60 to 90% of maximal heart rate capacity or 50 to 85% maximal oxygen uptake (VO2), Time: 15- to 60-continuous minutes each session, Type: exercise should be rhythmical whole body movements facilitated by the large muscles in the body (ACSM, 1990).
The recommendation for moderate physical activity became a joint initiative of the Centre for Disease Control (CDC) and the American College of Sports Medicine (ACSM). An ‘expert panel’ was formed by the CDC and ACSM to objectively assess scientific evidence and subsequently prepare a public health message pertaining to the amount and type of physical activity required for health promotion and disease prevention. The summary recommendation stated that, “All US adults should perform 30- or more minutes of moderate physical activity on most, preferably all, days of the week” (Pate et al., 1995, p. 402). The USDHHS (1996) added, “… either as a single session or ‘accumulated’ in multiple bouts, each lasting at least 8- to 10-minutes” (USDHHS, 1996, p. 5). The recommendation can also be interpreted as the accumulation of at least 150-minutes of physical activity per week (30-minutes per day on at least 5 days per week; Bauman & Egger, 2000).

The current moderate physical activity guidelines differ from previous ACSM recommendations in that it acknowledges that not all people are capable of, or want to adhere to, a vigorous physical activity routine and that substantial health benefits can be derived from being active at a moderate intensity. Whilst the current recommendation still recognises that additional benefits may be gained from participating in physical activity prescribed by the original ACSM FITT formula, there are three main differences between the two recommendations:

1. The current guidelines allow a reduction in the minimum intensity of exercise from 60% of maximum heart rate to 50% of maximum heart rate for most people and to 40% of maximum heart rate in people with very low fitness levels.

2. It increases the frequency of activity from 3- to 5-days a week to 5- to 7-days per week, depending on the intensity and duration of the exercise session.

It allows for the accumulation of 30-minutes through bouts of at least 8- to 10-minutes, as scientific evidence has shown that short bouts of exercise are as beneficial as one long continuous bout of activity in term of fitness (DeBusk et al., 1990; Ebisu, 1985).

Since the U.S Surgeon Generals Report (USDHHS, 1996), Jakicic et al. (1995) and Jakicic & Wing (1997) confirmed that health benefits can be accumulated from participating in three, 10-minute bouts of physical activity (walking) as opposed to one, 30-minutebout. The authors reported significant increases in both fitness and weight loss in obese women (Jakicic & Wing, 1997) following the accumulated bouts principle. Therefore, increased physical activity incorporated through changes in everyday lifestyle activities may be beneficial in previously sedentary people (USDHHS, 1996).

The new physical activity message does not replace or supersede the previous statements on exercise (like the FITT formula), rather it is meant to complement it. If people are already or want to participate at the previously recommended vigorous intensity level they should be encouraged to do so (providing they have a medical screen prior to starting such a program if they are aged over 35-years; USDHHS, 1996).

### 2.4 Physical activity as a public health goal

Until recently it has been a constant struggle to try and motivate sedentary people to comply with or even think about traditional vigorous physical activity recommendations. The recent epidemiological evidence that suggests that moderate physical activity can be beneficial (by showing a positive dose-response gradient between physical activity and health outcomes), allowed a more acceptable public health goal to be set. The NSW Chief Health Officer issued the statement that “Every adult in New South Wales should accumulate 30-minutes of moderate physical activity on most, preferably all, days of the week” (NSW Health, 1996a, p. 1), in an effort to provoke public interest in physical activity, and make physical activity a more achievable public health goal.
2.4.1 Cost effectiveness of physical activity promotion

Although the relative risk of ill health from being inactive is similar to the risks associated with smoking and hypertension the prevalence of inactivity is much greater, therefore, affecting far more people. This suggests that if physical inactivity were removed as a risk factor there would be far greater health benefits and effects on the public health system than removing any other risk factor.

Hahn et al. (1990) estimated that 23% of all deaths (from coronary heart disease, stroke, diabetes and cancers) could be prevented if physical inactivity was removed as a risk factor. For comparison the authors offered that 33% of deaths were attributed to smoking, 23% to high blood cholesterol, 24% to obesity, 1% to alcoholism and 1% to missed mammography screening. These data suggest that physical activity requires at least as much attention from public health prevention programs as do any of the other health concerns listed. However, little information exists on cost effectiveness of the promotion of physical activity.

A hypothetical study modelled the cost effectiveness of regular exercise as a preventer of coronary heart disease (Hatzianandreu et al., 1988). The authors included two hypothetical cohorts in the model. Each cohort consisted of 1,000, 35-year old men, however, one cohort expending 2,000 kilocalories per week through exercise and the other cohort did not exercise at all. The men were followed for 30-years to predict differences in the number of coronary heart disease events and life expectancy, (assuming those who did not exercise had a relative risk of 2.0 for the incidence of a coronary heart disease event). Jogging was used to estimate injury rates, costs and value of time spent exercising. While the costs of encouraging people to start and maintain an exercise program were not incorporated into the model, the authors estimated that 7,660 fewer coronary heart disease events and 25,036 fewer coronary heart disease deaths would occur, as well as 2,751-years of life would be preserved, in the cohort of regular exercisers compared to the non-exercisers. The authors concluded that for those people who enjoy exercise, it was the most cost effective method of preventing coronary heart disease, but for those who did not enjoy exercising, the cost-effectiveness was comparable to that of drugs and surgical intervention (Hatzianandreu et al., 1988).
More recently an Australian consortium modelled the cost effectiveness of promoting the 44% of adult Australians who are insufficiently active to become sufficiently active (Stephenson et al., 2000). Using conservative estimates of disease associations they suggested that 6,400 deaths from coronary heart disease, type II diabetes mellitus and colon cancer and up to 2,200 more deaths from the other conditions were related to being physically inactive. They also predicted that $377 million per year in health care costs could be avoided if everyone were to become sufficiently physically active (Stephenson et al., 2000). Therefore, exercise may well be as it was once described: ‘today’s best buy in public health’ (Morris, 1994).

2.5 Prevalence of physical activity and inactivity in Australia

Across most industrialised countries, it has been estimated that at least 20% to 30% of the population are inadequately active to accrue health benefits (Sallis & Owen, 1999; NIH Consensus Statement, 1995; Blair et al., 1994). Within Australia physical activity levels have been monitored by different organisations since 1981. The National Heart Foundation Risk Factor Prevalence Survey (1981) reported that as many as 49% of Australian men and 67% of Australian women did not engage in any exercise. Since then the Australian Department of the Arts, Sport, the Environment, Tourism and Territories (DASETT) conducted surveys between 1984 and 1987 (n=17,053; Bauman et al., 1990). The data collected from the DASETT surveys reported that only 19% of the sample could be categorised as vigorously active, 19% were categorised at moderately active; 36% were reported as being active at a low level and 30% were sedentary. This equated to 66% of the sample being insufficiently active to gain health benefits (Bauman, & Owen, 1999). These figures prompted a national goal to be established in 1993 ‘to increase the proportion of the population who participate in regular physical activity’ (Nutbeam et al., 1993).

A State-based health promotion survey conducted in 1994 estimated that 50.1% of adults (aged over 18-years of age) living in NSW were inadequately active for their health, of which 13% were classified as sedentary (reporting no leisure time physical activity at all; Bauman, Bellew et al., 1996). Furthermore, adults aged over 40-years of age were significantly more likely to be inadequately active than adults aged under 29-years (40- to 49-years 51%, 50- to 59-years 46%, over 60-years over 53% more likely to
be inadequately active than adults aged between 18- and 29-years; Bauman, Bellew et al., 1996). A similar survey conducted again in 1996 reported no change in the level of inadequate physical activity in NSW adults, which has remained at 49.6%, of which 18.1% were sedentary (Bauman, Booth et al., 1997). It appears therefore, that without intervention inadequate physical activity levels in NSW will remain unchanged or worsen in the years to come (considering the level of sedentariness increased from 13 to 18% in 2-years).

Increased awareness of the importance of regular moderate physical activity has prompted researchers to search for appropriate physical activity intervention strategies. However, effective methods of motivating people to be more physically active have not yet been determined (Dzewaltowski, 1994). This may be due to physical activity as a public health concern has been under-recognised and under-resourced in preference for other more publicised health concerns. For example the prevalence of inactivity is about twice that of tobacco use (Bauman & Egger, 2000). Both these health problems have substantial morbidity and mortality rates associated with them (Marcus & Forsyth, 1999), yet smoking cessation has received much more public attention over the past few decades compared to physical inactivity. Testimony to this is the fact that the U.S Surgeon Generals Report on the Health Consequences of Smoking was first published in 1964, as the Surgeon General's Advisory Committee on Smoking and Health document (http://www.cdc.gov/tobacco/30yrsgen.htm; USDHHS, 1964). Whereas, the equivalent report on Physical Activity and Health was first published in 1996 (USDHHS, 1996), some 25-years later. Furthermore, within Australia, a bold but necessary comparison shows that current Australian State and Territory spending on tobacco control was at least $15 million p.a. (AIHW, 1996). Whereas, a NSW Health Central Policy Unit estimated costs associated with staffing the unit, operating for the benefit of 17 Area Health Services, had an estimated budget of around 12% of the total tobacco control expenditure in 1997/98 (Stephenson et al., 2000).

Clearly, physical activity is under-resourced in comparison, especially when you consider physical activity is a much more complex behaviour than smoking (Booth, Owen et al., 1995) and seemingly would require more fine tuned involvement of numerous agencies to solve the problem. As a result the general publics' concern
regarding physical inactivity is much lower than their concern for smoking cessation. While, physical inactivity is not widely accepted as a real threat to the health of individuals, physical activity promotion initiatives are forced to seek thrifty, cost effective methods of achieving mass change across whole populations. In light of this all aspects of physical activity as a behaviour need to be considered.

2.5.1 Determinants of being physically active

Understanding the determinants of physical activity are important in order to appreciate physical activity as a planned behaviour and to aid in designing intervention strategies that will assist with changing the behaviour. A comprehensive review of the determinants of physical activity was conducted by Sallis & Owen (1999). Therefore, an overview of the most important factors which may help influence and guide interventions is summarised below.

Sections of the population who are most likely to be sedentary, which appear common to most industrialised nations include:

1. Less educated individuals are more likely to be physically inactive (Pate et al., 1995; Owen & Bauman, 1992; DASETT, 1992, Stephens et al., 1985), as are those with lower socio-economic status and income. More specifically, increased education was shown to be positively associated with leisure time physical activity, but negatively associated with work time physical activity (King et al., 1992).

2. Individuals tend to reduce their participation in vigorous physical activity as they get older (Pate et al., 1995; Bauman et al., 1990; Sallis et al., 1986; Sallis et al., 1989; Sallis et al., 1990; Stephens et al., 1985). However, this is not apparent with participation in moderate physical activity.

3. Women are less likely to be vigorously active, compared to men (Bauman et al., 1990; Stephens, 1987). However, women are more likely to adopt a moderate physical activity program (Sallis et al., 1986).
4. Regardless of gender, individuals who had been active for at least 6-months were more likely to be active at 12-months both in supervised and free-living physical activity programs (Godin, Shephard et al., 1986; Sallis et al., 1986).

Whilst determinants such as those listed above are largely unchangeable, they are important to consider when planning interventions since they help determine where, what and how physical activity programs should be promoted. Therefore, it seems that intervention strategies should be directed towards poorer sections of the community including those who are less educated, and have less disposable income.

Other determinants of physical activity which are modifiable are important in defining intervention strategies. Psychological and behavioural determinants such as self efficacy, social support and perceptions of physical activity can have a major impact on participation levels of individuals. Sallis et al. (1986) reported that one’s belief in the health benefits associated with activity was the most often reported reason for engaging in physical activity. Social support has also been shown to be a strong predictor of success in adopting and maintaining a physically active lifestyle, particularly for women (Sallis et al., 1992). An individual’s intention to be physically active also predicts their ability to be active (Godin, 1994). Perceived enjoyment of physical activity is another major factor in initiating and continuing participation in physical activity, where active people consistently report higher levels of enjoyment from participation than do those who are not active (Calfas et al., 1996; Sallis et al., 1989).

Interestingly both active and inactive individuals recognize physical activity as a positive health influence (Andrew et al., 1981), but many still do not include physical activity in their daily life, often citing barriers to participation. The most commonly cited barrier is a ‘lack of time’ (Zunft, Friebe et al., 1999; Jaffee, Lutter et al., 1999; Booth, Bauman et al., 1997; Dishman et al., 1985), an interesting barrier considering the average American adult watches 3-hours of television a day (Sallis & Owen, 1999). Foremost barriers are usually modifiable excuses, which need to be eliminated through education and prioritisation.
Whilst it is impossible to influence all known determinants of an individual's physical activity status, several psychological theories have been developed, from which various intervention strategies have evolved. Recent intervention programs have aimed at encouraging inactive people to be more physically active by altering their perceptions and beliefs of appropriate physical activity, enhancing self efficacy, intention and enjoyment, as well as stimulating choice and social support networks. Further information on intervention programs will be presented in Section 2.6.

2.6 Physical activity interventions

An intervention is a set of activities designed to foster a positive behaviour change within a target population. Interventions may be limited by variables such as the setting (eg., clinics), the strategy (eg., physician counselling), and the target population (eg., ethnic women). An intervention may be small or large scale, carried out in isolation (at an individual level), or in combination with other factors (a program; King et al., 1992). Since the overall public health aim of promoting physical activity is to reduce the prevalence of inactivity across whole communities (Bauman & Egger, 2000) large-scale intervention programs need to be developed and evaluated, where they may have the greatest impact in terms of public health impact.

Central to the development and implementation of large-scale physical activity interventions are the foundations provided by psychological theory and behaviour modification methods used in small scale, individually focussed interventions. Strategies shown to be effective in small-scale individually focussed interventions, may be incorporated into large scale, population based interventions. Behaviour modification techniques that have been successful in small-scale interventions that may be incorporated into larger scale include goal setting, feedback response, relapse prevention training, decisional balance, using rewards and written agreements (King et al., 1992). Several comprehensive reviews have been published on physical activity interventions over the last 10-years. To prevent repetition of these reviews only effective components of successful small and large-scale interventions will be referred to in this review.
2.6.1 Interventions for individuals and small groups

For the purposes of this review interventions for individuals and small groups’ includes interventions designed with direct face-to-face contact, either for evaluation or intervention, and interventions that involved attending exercise groups or classes.

2.6.1.1 Individually focused interventions

Mixed successes have been reported from small-scale interpersonal interventions. Such interventions are typically focussed on clinical populations, and/or involve health and fitness appraisals as well as personal training programs. Hence these programs can be quite intensive, requiring a lot of commitment from the participants. Nonetheless, initial trials demonstrated some success in increasing physical activity levels in men at risk of coronary heart disease (King et al., 1992). However, further studies, such as the Canadian Home Fitness Tests and Health Appraisal program, had limited impact on the participants intention to be physically active and had little or no impact on actual leisure time physical activity after 3-months (Godin et al., 1987). Other studies reviewed by King et al. (1992) demonstrated modest increases in physical activity in the short-term (up to 3-months), but long-term improvements were not supported. Therefore, it would seem that fitness tests and health appraisals may have a positive impact on initial motivation in both healthy and clinical samples, but the effects are short lived and can only involve small samples making these strategies impractical for a community based intervention.

2.6.1.2 Group based face-to-face interventions

Many group-based studies have been conducted in highly selected (white males) small samples, over short time frames (up to 12-weeks). The few follow-up studies reviewed by King et al. (1992) indicated that any increases in physical activity participation were often short lived after the intervention was removed. These findings led Dishman (1991) to question whether the intervention effects were simply a manifestation of the social support provided by the investigations themselves.
Nonetheless, the efficacy of behaviour modification and cognitive-behavioural techniques has also been studied in controlled group settings. These programs have reported 10% to 75% increases in physical activity participation by the program participants. Behavioural strategies such as written agreements, contracts and lotteries, as well as stimulus control strategies and contingency management have been used with positive results in both case-controlled and quasi-experimental investigations. Other cognitive-behavioural approaches such as self monitoring, goal setting, feedback, relapse prevention training, and decisional balance have also appeared to be equally effective when used in isolation or in combination. However, few studies have been of a randomised controlled design (King, Taylor et al., 1988; Martin & Dubbert, 1982).

In a review of 25 physical activity intervention studies by Baranowski et al. (1998)*, concluded that the most successful interventions were those which included volunteer subjects who may have been motivated to be involved and had a pre-conceived idea of behaviour change before entering to program. The authors also reported that while the results were statistically significant they were clinically modest (Baranowski et al., 1998).

King, Rejeski et al. (1998) reviewed a further 29 physical activity interventions aimed at older adults (over 50-years of age). The strengths reported in the review were reasonable participation rates and long study durations. However, very little research has been conducted using unmotivated, non-volunteer samples (King, Rejeski et al. 1998). Similarly, there was a lack of behavioural or program based interventions, and a limited number of replication studies and sub-group evaluations. One of the few studies that has been replicated, involved a telephone-supervised home-based program and a home/group-based study in middle aged adults (Gossard, Haskell et al., 1986; Juneau, Rogers et al., 1987; King et al.,

* Six of the interventions were school based and will not be reviewed here, as the focus of this thesis is middle-aged adults. The remaining 19 studies will be briefly discussed the following sections.
1988). These studies have been shown to be successful up to 2-years (King et al., 1995; see Section 2.6.2.5). The more successful program reported better adherence to three vigorous activity sessions per week rather than five moderate sessions per week (King et al., 1995; see Section 2.6.2.5 for more details on this study). Therefore, it would seem that the added frequency of activity (despite less intensity of the activity) was more of a deterrent than participating at the higher intensity activity fewer times a week.

The efficacy of telephone-based interventions has been evaluated. Traditionally telephone-based interventions have used an initial 20- to 40-minute face-to-face assessment and consultation to define an appropriate physical activity program, which is then supported by 12 to 15 additional telephone contacts (approximately 10-minutes each in duration) over the intervention period to help support physical activity behaviour change. Although these telephone-based programs, have received the most empirical support in promoting physical activity (King, Rejeski et al., 1998), further research was recommended to assess the generalisability of the intervention, including important sub group analysis and dissemination prospects. Disseminating such an intervention may be limited by the ongoing costs involved in administration, training staff, continued tailoring of the telephone contacts and the ongoing maintenance of the program in general.

2.6.1.3 Physician-based interventions

Physicians and General Practitioners (GP) have been recognised as an important vehicle for promoting physical activity, since they see most of their patients annually or bi-annually (USDHHS, 1996). Two multiple component intervention studies involving GPs have been reported, (i.) the INSURE program, conducted in the United States (Logsdon et al., 1989) and (ii.) the Fresh Start program, conducted in Australia (Graham-Clark & Oldenburg, 1994). The INSURE program used medical education programs and strategies aimed to remind participating physicians to promote healthful behaviour to their patients. Participating physicians were reimbursed for the preventive counselling sessions. After 1-year, 34% of the patients who received the intervention were exercising, compared with 24% of the control patients (Logsdon et al., 1989). The Fresh Start
program, relied on self-help booklets and videos given to patients by their GP to help them change multiple behaviours related to cardiovascular health. The Fresh Start program reported no effect on physical activity habits at either the 4- or 12-month follow-up (Graham-Clark & Oldenburg, 1994). The authors suggested that the physical activity component may have been diffused amongst all the other health related information, and more specialised attention may need to given to physical activity (Graham-Clark & Oldenburg, 1994).

In 1994 the London Health Education Authority conducted a review of physical activity interventions in primary health care (Biddle et al., 1994). The review reported there were a variety of models in operation, the majority of which revolved around GPs and other health professionals, referring their patients to physical activity centres where they could join at reduced rates. The typical intervention follow-up period was a relatively short being around 10-weeks. Whilst it was difficult to evaluate the success of each intervention, anecdotal evidence suggested good compliance to the programs by the participating GPs (Biddle et al., 1994).

Another physician project, PACE (Physician Assessment and Counselling for Exercise) was initiated in the United States (Patrick et al., 1994). The PACE program itself was developed using the Stages of Change (refer to Section 2.7.1 for more information on the Stages of Change), and targeted known modifiable determinants of physical activity such as self efficacy, social support, and the barriers to participation (Patrick et al., 1994). Physical activity evaluation questionnaires were completed prior to the patients’ consultation with their physician and were used to determine the patients’ physical activity Stage of Change. Patients were, therefore, categorised in one of three groups (i) Pre-Contemplation, (ii) Contemplation or (iii) Action and counselled accordingly (Patrick et al., 1994). Patients’ received a follow-up telephone call 2-weeks after the counselling session as a reminder and support strategy. Follow-up evaluation was conducted 4- to 6-weeks post counselling. Participants who were followed up reported greater readiness for adoption of physical activity and a 30-minute increase in walking in the past week than control participants. Subsequent results
of a 5-month follow-up trial were evaluating using 98 patients (Long et al., 1996). These results reported some increase in readiness for adoption and some increased behaviour change. The authors concluded that project PACE was efficacious enhancing physician confidence in counselling patients and produced short-term increases in moderate physical activity in previously sedentary subjects (Calfas et al., 1996; Calfas et al., 1997). However, the sample was very small and self selected.

Evaluations of physical activity prescriptions given to patients by GPs (incorporating the verbal and written advice) have been conducted, in Australia and New Zealand (Bull et al., 1998; Swinburn et al., 1998). The recent Green Prescription trial in New Zealand compared the impact of verbal advice from a GP with a written physical activity prescription and found that the latter approach lead to greater changes in several of the physical activity measures (Swinburn et al., 1998). Promising short-term increases in physical activity were also reported in studies, which have incorporated the Transtheoretical model of behaviour change (see Section 2.7.1) to tailor physical activity prescriptions to the needs of the patient (Bull & Jamrozik, 1998; Calfas et al., 1996).

From the literature reviewed thus far, it is evident that GP physical activity counselling may be moderately effective in increasing physical activity participation levels in the short term. However, the main barriers to this type of promotion have remained unchanged. For example, most GPs are not comfortable promoting physical activity (Shephard, 1995) as they lack appropriate training in suitable physical activity levels and counselling techniques for patients (Bull et al., 1995). A lack of consultation time, and reimbursement for preventive consultations are also deterrents to providing this service to patients (Sallis & Owen, 1999; Bull et al., 1995). Another shortcoming of this type of physical activity promotion is patients of GPs are most often visiting their GP for a health concern and may not necessarily be receptive to additional health promotion messages at that time. In addition the potential public health impact on reducing the overall level of physical activity in populations through physician-based interventions is limited by the number of people who see their GP on a regular
basis. Furthermore, GPs are more often involved in treating the ill-effects of physical activity, such as musculoskeletal injury and may rarely see the benefits of participating in physical activity for their patients (Shephard, 1995).

Nonetheless, some of the strategies used in these physician based counselling trials may be adopted to other more broad based programs, including the use of the Stages of Change and other behavioural strategies. The Stages of Change have also been successfully applied to work-site physical activity programs (Marcus, Banspach et al., 1992), and will be discussed further in Section 2.6.2.1.

2.6.1.4 Lifestyle physical activity interventions

Many people are not adequately active, as they perceived participating in vigorous physical activity as their only alternative to a sedentary lifestyle (Pate et al., 1995; Dunn, Andersen et al., 1998). However, lifestyle physical activity promotion represents an achievable goal for many, as it challenges most of the perceived barriers to exercise including; (i) lack of time (Booth et al., 1995), (ii) dislike of vigorous exercise (Sallis et al., 1986), and (iii) the conformity of gym-based programs (King et al., 1992).

The principal component of lifestyle physical activity is that the individual self-selects the type and intensity of physical activity which may be planned or unplanned (eg., walking to the shops). Lifestyle physical activity promotion represents the evolution of physical activity knowledge over the past two decades as it shares the same scientific foundation as vigorous physical activity, but emphasises the accumulating evidence surrounding in the benefits of moderate activity. Lifestyle physical activity has the advantages of flexibility in duration, time and intensity, and may be influenced by incidental environmental cues and behavioural strategies to reduce sedentary behaviours (Dunn, Andersen et al., 1998).

One intervention compared an unstructured lifestyle physical activity intervention (where the participants were encouraged to accumulate 10-minute bouts of any moderate activity) with a structured STEP aerobics class (Andersen et al., 1997). After 16-weeks there were similar significant improvements reported in both
groups in treadmill time, lipid profiles and blood pressure (Andersen et al., 1997). This study, however, was conducted on a small number (n = 40) of obese women and as such was not generalisable. Nonetheless, the study provided a foundation from which further lifestyle activity intervention strategies could be evaluated.

Another study evaluating lifestyle physical activity compared three different intervention strategies; (i) self-help booklets to promote lifestyle activity, (ii) self-help booklets to promote structured exercise and (iii) personal feedback on fitness and health aspects specific to the participant (Cardinal, 1995; Cardinal & Sachs, 1995). The self-help booklets were designed to motivate, encourage and support the participants’ movement through the physical activity Stages of Change (see Section 2.7.1 for further information on the Stages of Change) and were delivered through the mail to the 113 subjects’ workplace (Cardinal & Sachs, 1995). Results showed significant increases in the Stages of Change in all three groups, with 10% of participants reporting an increase in their physical activity participation. However, the trend existed for the lifestyle group to improve more than the other two groups. It was concluded that the lifestyle physical activity promotion program was effective, when delivered through the mail in a self-help booklet (Cardinal & Sachs, 1996; 1995). Most importantly the dissemination method of sending the written support materials through internal work-site mail demonstrated potential, which should be evaluated in a community setting. Mail dissemination has the potential to, at low cost reach large numbers of inactive people who would not normally seek information. Mail dissemination should be more effective than the method used in the Minnesota Heart Health Campaign where self-help print materials were placed in physician waiting rooms received a low recognition rate of 15% during the evaluation (Blake et al., 1987). The potential of a mailed-based intervention as a method to promote increases in reported physical activity was also evaluated by Marcus, Emmons et al. (1998; see Section 2.7.3).

Project ACTIVE was another lifestyle physical activity promotion program aimed at comparing a lifestyle physical activity education program supplemented with behavioural training techniques to a structured exercise program conducted in a
gymnasium (Dunn, Marcus et al., 1997). After 6-months the authors concluded that the lifestyle program was as effective as the structured exercise program in increasing activity levels and reducing some of the risk factors associated with CVD, namely blood pressure, cholesterol, and body fat (Dunn, Marcus et al., 1997). The program was also effective in promoting the CDC/ACSM physical activity recommendation where after 6-months 78% of the lifestyle group and 85% of the structured exercise group were meeting the criterion (Dunn et al., 1998; Dunn, Marcus et al., 1997; Dunn, Blair et al., 1997). Furthermore, 25% of the lifestyle group and 30% of the structured exercise group had maintained a greater than 10% improvement in fitness after 2-years (Dunn, Garcia et al., 1998; Dunn, Blair et al., 1997). The authors concluded that lifestyle physical activity intervention was as effective as a structured exercise program in helping individuals meet the established criterion of healthful physical activity (Dunn et al., 1999). The results of Project ACTIVE were particularly encouraging because lifestyle physical activity may be more attractive to sedentary people as it has been reported that up to 50% of people tend to drop out of structured exercise classes after 6-months (Dishman, 1985). The effectiveness of Project ACTIVE was most likely be due to the behavioural skills training provided during the weekly lifestyle physical activity education training and ongoing follow-up and telephone support tailored to individuals’ Stage of Change (Dunn et al., 1999; Dunn, Andersen et al., 1998).

Lifestyle physical activity intervention programs have also been shown to be successful in small volunteer samples when facilitated by face-to-face counselling and weekly group counselling sessions (Dunn, Andersen et al., 1998; Jakicic et al., 1997; Andersen et al., 1997; Dunn, Marcus et al., 1997; Dunn, Blair et al., 1997; Jakicic et al., 1995). These lifestyle physical activity programs, however, have often been supplemented with telephone support (Dunn, Marcus et al., 1997; Dunn, Andersen et al., 1998). Thus, it remains to be seen if similar intervention strategies would be as effective, without the ongoing telephone based support. A review by Dunn, Andersen et al. (1998) reported fourteen additional studies which promoted lifestyle physical activity, most of which are not repeated here. Dunn, Andersen et al. (1998) reported strengths in the current lifestyle activity research
being, the long follow-up periods (up to 2-years), and the variety of subject samples (obese children, elderly and minority groups) studied. However, the relative weaknesses of lifestyle activity studies were the small sample sizes which are pre-dominantly made up of volunteer participants (who may have a preconceived idea of changing their behaviour prior to participating in the study), and most have been conducted in clinical settings or work-sites, which are not generalisable to the general public (Andersen et al., 1997; Dunn, Andersen et al., 1997; Dunn, Blair et al., 1997). Therefore, large-scale randomised community investigations using successful components of the previous studies are required, particularly using non-volunteer samples.

2.6.1.5 Summary: Interventions for individuals and small groups

From the literature reviewed in Section 2.6 it is clear that interventions aimed at individuals and small groups can be effective in promoting and increasing physical activity participation in small samples, especially in the short term. However, the number of studies conducted using non-volunteer participants and lack of randomised controlled trials restricts the conclusions that can be drawn from such interventions. Similarly, such intervention strategies have limited potential to increase the physical activity levels of whole populations. Hence the public health impact of these small-scale interventions is negligible. However, there are some valuable components of the more successful small-scale programs, which may be adapted to suit a comprehensive large-scale, population-based approaches to physical activity promotion and these components should be investigated using mass distribution methods. Possibly the most appropriate intervention strategies to be learnt from the small-scale interventions were the idea of using self-help booklets, and incorporating behaviour change theories to assist people to change, both of which are explored further in the next section.

2.6.2 Interventions for populations and settings

The public health problem of physical inactivity has forced the need for intervention strategies to move away from individual treatment programs to broad-based community interventions, where the possibility of reaching a greater proportion of the under-active population at a lower cost is facilitated (King, 1994). Broad-based,
large-scale intervention programs that focus on whole communities and populations at risk of being inactive need to be developed, implemented and evaluated (Sallis et al., 1998) in the setting for which they were designed.

Larger scale physical activity intervention programs can be facilitated through work-sites and other institutions like universities, and schools, as well as to the general community through mass media campaigns, environmental modification and possibly through mass distribution of self-help print interventions. Each of these potential strategies will be reviewed in subsequent sections of this review.

2.6.2.1 Work-site interventions

Work-sites offer a unique opportunity to promote and encourage physical activity a collective group of people. Worksites have the potential to foster a supportive environment for behavioural change and have existing channels of communication suitable for disseminating health messages. However, conducting controlled trials in work-sites remains a challenge and most studies conducted in work-sites to date have methodological limitations (King et al., 1992). Several reviews on work-site interventions reported a lack of controlled studies but in the studies that had been conducted various problems existed (Dishman et al., 1998; USDHHS, 1996; Shephard, 1996; Glasgow & Terborg, 1988). Problems include low recruitment and high drop-out rates as well as poor maintenance of programs.

A more recent review of work-site physical activity intervention which have been conducted in the U.S, Australia and Europe was published by Dishman et al. (1998). The authors concluded that work-site physical activity promotion programs have not reached their potential in producing significant results, but that most work-site studies reported to date had achieved small positive effects which were not substantially different from zero. Several clinical work-site studies were reviewed which used within group comparisons (rather than comparing the intervention group with a control group), which may inflate the effects of the intervention (Dishman et al., 1998). Results may have also been inflated by self selection bias (Dishman et al., 1998), as typically only 20 to 30% of the workforce volunteered to be involved in the intervention and often those volunteering
are usually least in need for the intervention (Lovato & Green, 1990). Dishman et al. (1998) also reported that the effects were smallest in the randomised and controlled studies, and that studies which included behaviour modification strategies reported the greater success. Employer involvement is considered vital to the success of work-site programs and special effort is required to reach the sedentary and unmotivated sections of the work force.

Another problem with work-site programs is contamination from secular trends and incentives offered by the work-site, poorly validated outcome measures, and inappropriate randomisation and statistical methods (Dishman et al., 1998). For example, many studies randomised groups by work-site (which may present a clustering bias effect) and then retained the individual as their level of comparison during statistical analysis (Dishman et al., 1998).

In conclusion, work-site physical activity intervention strategies need to be adopted more broadly and should involve behaviour change strategies rather than simply educational matter. The use of peer support groups, hierarchical strategies and other behaviour modification techniques may ensure future success of work-site programs, as would providing supportive environmental changes (such as on site shower facilities and secure bicycle storage facilities). These approaches however, may not be useful in the scheme of public health promotion, as it is generally limited to organizations.

2.6.2.2 Other institutional interventions

Institutional- and school-based programs are the primary base from which children and adolescents receive education and training with regard to physical activity. Research is needed to determine methods through which life-long activities, like walking, may be encouraged in schools (Sallis & McKenzie, 1991) to help prevent future sedentariness in adulthood. While it is beyond the scope of this thesis to review literature on adolescent physical activity interventions, there are many logistical problems involved in implementing interventions at this level, and as such very few interventions have been evaluated.
Neighbourhood centres and places of worship are potential associations through which group-based physical activity programs may be implemented (King et al., 1992). However, such venues again attract a select few of the total community and may have less potential for broad public health impact.

2.6.2.3 Mass media interventions

Mass media has been shown to heighten awareness and knowledge about physical activity in population samples but appears less useful as an intervention strategy to motivate the behavioural change (King, 1994). For example, The Health Education Board for Scotland undertook a national mass media campaign using television and radio advertising, to promote ‘Walking: Take Exercise in Your Stride’ (Wimbush et al., 1999). Population surveys showed that campaign awareness peaked at 70% after the first 4-weeks of advertising, dropping to 54% before the second round of advertising, after which it peaked again at 60%. Despite good campaign awareness, there was no significant change in actual walking behaviour reported. Furthermore, a major component of the campaign was a free call telephone number provided for people interested in gaining additional information on walking to call. However, only about 5% of survey sample actually reported using the telephone number, what's more most callers to the information line were already active, seeking additional information for their current activity programs (Wimbush et al., 1999). These results were similar to the results from the Illawarra Physical Activity Project (NSW, Australia) where a mass media campaign was also implemented. The campaign was shown to be effective at increasing awareness of appropriate physical activity knowledge, but was not as effective in changing behaviour, nor did it attract the under active sections of the community to seek information as indicated by the minimal number of calls made to an ‘Active Info’ telephone line, which was also mostly utilised by people who were already active (IPAP, 1999). The limited success of such mass media campaigns to motivate the inactive proportions of the community has been reported elsewhere together with the fact that the campaigns may simply act to reinforce the behaviour of the already active proportion of the population (Marcus & Simkin, 1994; Owen et al., 1987).
A more positive result was reported in Australia after the National Heart Foundation conducted a two-phase mass media campaign in 1990 (‘Exercise: Make it Part of Your Day’) and 1991 (‘Exercise: Take Another Step’). Independent pre- and post-campaign population surveys not only reported high post campaign awareness but increases in self-reported walking levels (Booth, Bauman et al., 1992). However, despite the success of the first phase of the campaign in increasing activity levels, the second phase of the campaign did not achieve the same amount of success. The second campaign phase was, however, successful in reinforcing increases in walking prevalence reported after the initial 1990 campaign, since walking levels did not decline back to pre-1990 campaign levels (Owen et al., 1995). The authors hypothesised that the follow-up campaign provided good reinforcement, but it was not sufficient to motivate anyone who was not previously motivated by the 1990 campaign (Owen et al., 1995). Therefore, other methods may need to be employed to supplement future mass-media campaigns to motivate the other inactive people within the community. A major limitation of mass-media campaigns is they are expensive to conduct as they are often broadcast through paid and unpaid media, including posters, leaflets and stickers. Such programs may therefore, not be a viable public health promotion strategy.

Another Australian physical activity campaign, ‘Life Be In It’ conducted in the late 1970’s and early 1980’s, gained extensive attention and is still often recalled in population surveys even though it has been two to three decades since it has been aired on television (Illawarra Physical Activity Project, 1995). Unfortunately, this campaign was not formally evaluated in terms of impact on physical activity participation rates, but remains a contaminating factor in Australian physical activity media research.

More recently in 1997, another mass-media campaign to promote physical activity was initiated by the NSW Physical Activity Taskforce in Australia. The Taskforce focused on the key concept of involving all stakeholders in the planning of a population-based approach to physical activity promotion (Bauman et al., 1998). The first strategy the Taskforce implemented was a mass media campaign with the
slogan, 'Exercise: You Only Have to Take it Regularly, Not Seriously'. The campaign was systematically evaluated by independent self-report pre- and post-campaign surveys. Although unprompted campaign message recall did not change between evaluations, prompted recall of the campaign slogan increased significantly in the post-campaign survey. Self report physical activity data analysis, showed increases in time spent walking in the least active proportion of the sample (Bauman et al., 1998). Therefore, the campaign had a limited impact on physical activity levels.

From the literature reviewed it is evident that mass media can increase awareness of appropriate physical activity recommendations, but realistic expectations of what can be achieved from such strategies in terms of behaviour change need to be established (Bauman et al., 1990). For example there was only a 0.8% per annum decrease in smoking prevalence in Australia during the 1980's when a substantial mass-media anti-smoking campaign was established (Sallis & Owen, 1999). Booth, Owen et al. (1995) suggested that a similar increase in physical activity levels would be a realistic expectation, as it will take time to educate the community on the role physical activity has in health preservation. Thus, influencing and changing the behaviour of entire populations can be a very challenging and slow process.

Despite the difficulties, large-scale mass media campaigns have the potential to reach large numbers of people and increase public awareness of appropriate messages. Therefore, mass media intervention programs may need to be more focused on their target population and supplementary, supportive strategies based on behavioural management and community change techniques may also need to be incorporated into the public system at the same time to maximise the effects on the entire population. In addition, environmental changes and support may also help facilitate a comprehensive effort to reduce sedentariness in whole populations.
2.6.2.4 Environmental interventions

Conceptualising physical activity interventions on a population wide basis has led to the consideration of environmental and policy changes to help facilitate behaviour change. Community studies have shown that environmental manipulation can influence the choices people make. Brownell et al. (1980) conducted a landmark study on promoting the use of stairs. Simply placing a sign promoting the use of the adjacent stairs because it was “better for your heart” in front of an escalator was effective in tripling the flow of people ascending the stairs. Post-test results showed a residual effect with 10% of people using the stairs after the intervention was removed. These results were replicated by Blamey et al. (1995) and Andersen et al. (1997), the latter investigating the type of message required to gain the greatest shift in activity. The authors reported that either message (for health or weight control) promoted the use of the stairs equally well. These were simple, inexpensive, yet effective interventions demonstrating the possibility of larger scale environmental interventions, particularly if supplemented with educational mass media campaign programs. Further environmental manipulation studies are warranted to remind people of the choices and to opportunities to be physically active.

Focus groups conducted by Corti et al. (1994; 1995) reported that aesthetically pleasing parks and tree-lined walking paths were more likely to stimulate physical activity. People were also more likely to walk if there were shops near their home. Hahn & Craythorn (1994) reported that people considered that park and recreation land was mostly used for organised sport and not for unstructured physical activity, despite most people actually preferring to participate unstructured activities such as walking and cycling to organised sports. The authors also noted that where space for physical activity was available (parks and sports grounds) it was usually only designed for one sport or activity, making it inappropriate for other activities. They concluded that more multi-purpose physical activity venues were required (Hahn & Craythorn, 1994).

Environments that support physical activity are only as effective as the willingness of the community to use the facilities provided. For example Lineger et al. (1991)
made simple environmental and social changes at a naval air base to support and encourage participation in physical activity. Environmental changes included maintaining a bicycle path along the road way, extending the recreation facility hours, purchasing new exercise equipment and initiating running groups and competitions. Increased expectations from higher ranking officials also encouraged better physical performance creating a supportive social environment. Results showed that the intervention was successful with significant increases in all physical performance measures, including push ups, 1.5 mile run, sit ups and percentage body fat (Linegar et al., 1991). Although the environmental intervention was a success, it may be attributed to the closed environment in which it was conducted, making replication of this type of intervention to whole communities a challenge.

Vuori et al. (1994) conducted a multi-component program aimed at encouraging workers to commute to work either by cycling or walking. Using educational prompts, lotteries, and the provision of better shower and change facilities they prompted a 7% increase in physically active commuting and a 17% increase in other leisure time activity. Although these results were modest, they were generally supportive of environmental change combined with education as useful promoter of physical activity.

Large-scale environmental interventions require careful planning and co-operation of several stake holders (eg., health departments, work-site administrators, environment protection, transportation, architecture, recreation and entertainment), in addition to considerable time and money to become operable. Therefore, the real public health impact of this type of intervention may not provide a significant changes in the short term. Interventions which may have more direct effects are required in the short term. However, long-term environmental adjustments which support physical activity should continue to be planned for the long-term benefits they may provide.
2.6.2.5 Home-based, self instructional interventions

Most physical activity programs are conducted in groups in community settings. However, a large proportion of the public prefer to undertake physical activity outside structured classes, in locations and at times convenient to them (Booth & Bauman, 1997; King & Brassington, 1997; King, 1994; King, 1991; King et al., 1991; King, Taylor et al., 1990; Juneau et al., 1987). Promoting physical activity that can be performed around the home and in the individuals’ own environment allows the flexibility to choose when, where and how to undertake activity (King, 1994).

Home-based interventions have typically consisted of an initial fitness assessment followed by prescribed exercise (usually prescribed during a 30-minute face-to-face consultation). With the exception of the follow-up fitness tests (approximately bi-annually), participants were often unsupported during the program. Sometimes minimal support was maintained using mail or telephone contact to provide feedback and encouragement (King, 1994; see Sections 2.6.1.1 and 2.6.1.2).

Studies conducted on the development and efficacy of promoting home-based physical activity programs with minimal face-to-face consultation have been successful for cardiac rehabilitation patients (DeBusk et al., 1985) and, more recently, in work-site samples (Juneau et al., 1987), overweight people (King et al., 1989) and community volunteers (King et al., 1991; King, 1991). However, home-based programs have achieved mixed results, whereby simple health and fitness appraisals conducted prior to being prescribed a physical activity program were reported to be ineffective in increasing physical activity levels (Godin et al., 1987).

King et al. (1991) compared a group who were given the flexibility to choose when and where they exercised at home to a group asked to participate in structured exercise class (King et al., 1991). The trial was conducted over 2-years. At the end of both years the home-based exercisers completed more of their prescribed exercise than the structured exercise class. After 2-years 79% and 75%
of people in two home-based groups were still exercising compared to only 53% of the people randomised to the structured exercise class (King et al., 1991).

Another study by King et al. (1991) randomised 357 healthy men and women to a home-based program or a community-based program. The home-based participants showed greater adherence and comparable or better physical and psychological benefits (King et al., 1992; King et al., 1991). These results strongly support the efficacy of individual home-based physical activity promotion over regular group based activity sessions programmed within the community (King, 1994).

The more successful home-based interventions have provided ongoing instruction, feedback and support beyond the initial assessment and prescription for activity (Dishman, Sallis et al., 1985). Two studies used telephone support together with additional mailed relapse prevention materials over 6- to 12-months (King et al., 1989; King et al., 1988). As such the use of cognitive-behavioural techniques and ongoing program support (such as self monitoring, feedback, relapse prevention training, telephone and mail support) have been shown to be effective in increasing participation rates and indirectly supporting increased fitness levels (King et al., 1992; Juneau et al., 1987). King et al. (1992) concluded that the home-based interventions were an effective means of targeting those people who do not want to be involved in external exercise classes, although ongoing support seemed necessary in order to maintain effects.

The first Australian study to investigate home-based physical activity promotion using mailed materials was conducted by Owen et al. (1987). The intervention involved either a single mailing of all the materials or several mailings of the various sections of the materials every 2-weeks. The single mailing resulted in the superior improvements in physical activity in the short term. However, after 10-months there were no differences reported between the groups' physical activity levels. The authors concluded that home-based promotion of physical activity through the mail was effective in the short term, providing the recipient had all the materials at hand to progress as they wanted to (Owen et al., 1987). Further details of this study were presented in Section 2.6.2.6.
Hillsdon et al. (1995) reviewed ten randomised controlled trials of healthy free living adult subjects where exercise behaviour was the variable of interest. Most subjects were volunteers, predominantly white, well educated with ages ranging between 24- to 72-years (mean 49-years). Most of the intervention programs were home-based, involving walking, jogging, although structured exercise classes were also used. Subjects were usually asked to exercise between three and five times a week, while intensity was not often specified. Average follow up was 8-months with the exception of one trial which had a follow up of 12-years. The studies with the highest participation rates also provided the most professional contact, usually by telephone or occasional home visits. Varied frequency of professional contact found that those people who were contacted most frequently also exercised more frequently, and for slightly longer, therefore, achieving greater value out of the program than the subjects who received less contact (King et al., 1988). The amount of support required to enhance participation was around 60-minutes of telephone contact over 6-months (King et al., 1988), or 15, three-minute telephone calls over a 1-year period (King et al., 1991). Telephone support may therefore, be a simple means of supporting increases in physical activity in the long term, providing the administrative resources are available.

King et al. (1995) examined the effects of varying intensity (high and moderate) and physical activity formats (home-based and group-based) on participation rates, fitness and high density lipoprotein levels in adults aged 50- to 65-years. The home-based formats were more adequately adhered to after 1-year. However, by the end of the second year the moderate intensity home-based program adherence rates declined to a level similar to the group-based program (King et al., 1995). Anecdotal evidence suggested that 5-days a week was difficult for the participants to maintain, as the principal investigator had previously found that after a 1-year follow-up participants who continued to exercise usually did so just over two times a week (King et al., 1995). Results were very encouraging, as participants adhering to the prescribed amount of home-based moderate activity were shown to improve their fitness and lipoprotein profiles (King et al., 1995).
Hillsdon et al. (1995) concluded that the most successful intervention strategies (in terms of high participation rates) shared common features. They were home-based programs, promoted un-supervised informal exercise, had frequent professional contact, used walking as the main activity promoted whilst moderate physical activity was also recommended. Self monitoring or relapse prevention training improved early adherence to the programs. Instructional briefing and telephone support were successful in improving compliance and maintenance (Hillsdon et al., 1995). As such, these strategies need to be investigated in large-scale community intervention programs. A combination of promoting physical activity in the home environment, and using low cost mailed materials or telephone support, emphasising behavioural change techniques may be effective in promoting physical activity to whole communities.

2.6.2.6 Print-based interventions

Print materials have the potential to be widely distributed and are generally acceptable to whole communities (Owen et al., 1989). They may also provide cost-effective ongoing professional and social support (Dishman & Buckworth, 1996) without the formality, inconvenience of expensive of face-to-face interventions (Owen et al., 1987). Self-help print materials have been used to facilitate behaviour change in a wide array of health behaviours, namely weight loss, smoking cessation, alcohol abuse, stress management and exercise (Brown & Owen, 1992), and have the potential to reach socially disadvantaged sections of the population, who would not normally be reached by other intervention strategies (Marcus, Owen et al, 1998).

Printed self-help courses for physical activity promotion have been based on behavioural therapy techniques by making use of self-reinforcement techniques, environmental cues and physiological markers of improvement to educate participants on how to be more physically active. Such a self-help course was evaluated by Owen et al. (1987) who randomly allocated middle aged volunteers to one of four groups: (i) a control group who received no materials, (ii) a group who regularly attended fitness classes, and two groups who received the written self-help information in the mail, (iii) one group received the complete self-help
package all at once, and (iv) one group received seven separate mailings of the information 2-weeks apart. After 12-weeks significantly more of the one mailing group reported participating in adequate amounts of aerobic exercise compared to the group receiving the sequential mailings, which were similar to those involved in the fitness classes. However, after 10-months there were no significant differences between the four groups. Nonetheless, the mailed intervention demonstrated the capacity to reach and motivate a positive short-term behaviour change (Owen et al., 1987), and may be a potentially useful low cost intervention that may reach large numbers of people. The study, however, was limited by the volunteer sample, and also the type of activity it promoted, as the materials promoted physical activity based on the ASCM FITT formula which may have been too strenuous for some of the sedentary subjects to adopt in the short term. Larger, long-term increases in physical activity may have been reported if the moderate physical activity message was promoted. The authors (Owen et al., 1987) suggested further investigation of the use of such self-help materials delivered through the mail.

Another print-based intervention was conducted in a work-site by Cardinal & Sachs (1995, 1996), where self-help print materials were disseminated through internal work mail system (see Section 2.6.1.4). Two sets of written materials were produced for the intervention groups; i) those which promoted and supported lifestyle physical activity and ii) those which promoted a structured physical activity program. The materials were relatively short (up to 7 pages) and were guided by the Stages of Change (Cardinal, 1995; Cardinal & Sachs, 1995). Despite the booklets being very similar, the lifestyle activity materials received better results during formative evaluation in terms of content, credibility and potential to elicit an effect (Cardinal, 1995; Cardinal & Sachs, 1995). The intervention materials were delivered to the participants work-site and were accompanied by personal participant information on health status, body fat and predicted fitness level (Cardinal & Sachs, 1995). Therefore, participants were exposed to physiological tests, which alone may exert an intervention effect. Nonetheless, there was a significant increase in self reported physical activity by the lifestyle group over the control group, but the increase was not significant
from the structured exercise group at either the 1- (Cardinal & Sachs, 1996) or 7-month follow-up (Cardinal & Sachs, 1995). However, the authors reported that participants in the early Stages of Change (see Section 2.7) were more receptive to the intervention and than those in the later stages. Cardinal & Sachs (1996) also reported relative few community intervention using written materials had been conducted and that it seemed that encouraging lifestyle physical activity was the best method of enhancing sedentary interest in physical activity.

Other print-based interventions have used written agreements, behaviour contracts, goal setting, and decision making to facilitate 10% to 25% increases in physical activity participation (Dishman, 1991). Print interventions tailored to specific individuals in terms of personalised letters and gender orientation and Stage of Change have also been evaluated. However, the most effective method of tailoring remains unclear. King et al. (1992) recommended further investigation on the use of the Stages of Change in tailoring physical activity interventions for inactive people (see Section 2.7).

Based on the current review it is evident that the use of self-help print materials delivered through the mail may have the potential to promote physical activity to a large number of people making it an effective public health promotion strategy. Henceforth, this strategy could impose a real public health impact on reducing the level of physical inactivity across whole populations. Further work needs to be conducted on self-help print-based physical activity interventions.

2.7 Tailoring self-help print interventions

According to Prochaska & DiClemente (1982) the efficacy of a behaviour change intervention is largely dependent upon the individual’s pre-treatment degree of intention to change. However, traditional intervention programs tended to be action-orientated and essentially do not cater to the needs of the ‘at risk’ population, the majority of whom are not ready to take action. The ‘at risk’ population are usually unaware that they have a problem and/or have no intention of changing their behaviour and are, therefore, resistant to being forced to change. Consequently many intervention programs suffer from poor participation rates, high drop-out and low efficacy.
Intervention research has suggested that intervention programs tailored to help individuals’ progress at their own pace are more successful at encouraging participants taking action (Prochaska & DiClemente, 1992). Prochaska (1991) and DiClemente (1991) both pointed out the importance of matching treatment strategies to the individual’s Stage of Change. The Stages of Change may be used to change traditional ‘now or never’ action-orientated interventions to a ‘someday, soon, now and forever’ progressive intervention.

2.7.1 Theoretical basis of the Stages of Change: The Transtheoretical model

Prochaska et al. (1992) sought to describe the common principles underlying the structure of behaviour change by comparing the principles and strategies used by people who were self-motivated to change and those people who sought professional assistance. They discovered a series of five common stages during observations of people attempting to quit smoking either on their own or with professional treatment (Prochaska & DiClemente, 1982; 1983). Collectively the stages make up the Transtheoretical Model (TTM)* which integrates different processes and principles of change derived from 18 psychotherapy systems of behaviour change (Prochaska & DiClemete, 1982; Prochaska et al., 1992). The TTM views behaviour change as the natural progression along a temporal dimension namely the Stages of Change. The five Stages of Change broadly defined are†.

* The TTM relies on six assumptions related the nature of behaviour change, they are; i. no single theory can account for all the complexities of behaviour change, ii. behaviour change involves a process that unfolds over time through a sequence of stages which can be both stable and dynamic at any given time, iii. most ‘at risk’ populations are not prepared for action and are not assisted by traditional action-orientated programs, iv. without planned interventions the population will remain stagnant in their Stage of Change, v. specific processes and principles of change need to be applied at specific Stages of Change if progress through the Stages of Change are to occur, vi. chronic behaviour results from a combination of biological, social and self control.

† The Stages of Change as they specifically relate to physical activity will be discussed in more detail in the Section 2.8.2.
1. Pre-contemplators are generally unaware they have a problem and often attend therapy under the coercion of others. Pre-contemplators’ resistance to change comes from the strong belief that they do not have a problem at all, hence no intention to do anything about it. An effective intervention not only must try and first persuade pre-contemplators they have a problem behaviour, then inform them of the benefits changing their behaviour, and instil the belief that they have the ability to change (Bandura, 1977). A successful intervention with pore-contemplators would be to move them into contemplation.

2. Contemplators are receptive to the fact that they have a problem behaviour, and are seriously thinking about change, but have not made a commitment to change. Whilst they are aware of the problem they are far from taking action. It may take years for their intention to turn into a real commitment to change their behaviour. Contemplators seem to have an internal struggle with regard to the cost and benefits of changing (DiClemente, 1991; Prochaska & DiClemente, 1992; Velicer et al., 1985). A successful intervention with contemplators would result in them becoming preparers.

3. Preparers are ready to combine their intention to change with small commitments to behavioural adjustment. People in preparation are situated somewhere between contemplation and action with a strong intent on moving ahead into the action phase (Prochaska & DiClemente, 1992). Success for people in preparation is to move them into regular commitment to action.

4. Action involves actual behaviour change where subjects reach a preconceived criterion of behaviour change. Behaviour modification and reaching the criterion are markers for the action stage combined with the desire to maintain the change (Prochaska & DiClemente, 1992). People in action need encouragement and support to assist them to prevent relapse.

5. Maintenance is the stage where people who have changed their problem behaviour work to prevent relapse and consolidate the gains achieved from the action stage. Maintenance stage typically begins 6-months after the initiation
of action and most likely continues for the rest of the changer’s life (Prochaska & DiClemente, 1992).

While not all attempts to change are successful, people can cycle back and forth through the model before a successful attempt at behaviour change is achieved. For example, people trying to quit smoking may take three or four attempts at quitting before they are successful at achieving long-term maintenance (Schachter, 1982). Unsuccessful attempts at behaviour change are known as relapses. Relapse describes the changers regression back to an earlier Stage of Change. The majority of people who relapse do not, however, regress back to pre-contemplation. Rather they end up somewhere between contemplation and preparation (Prochaska & DiClemente, 1984). Most relapsers are often planning their next attempt at action whilst considering the results of their previous effort. Therefore, each time a person relapses they are ultimately working toward the end result as they continually learn from their mistakes and try new methods the next time they attempt to change their behaviour (DiClemente et al., 1991).

Further research on the TTM revealed three additional constructs are important when explaining how or why individuals progress thorough the model. The three constructs are the; i) Processes of Change, ii) Decisional Balance, and iii) Self-efficacy. The Processes of Change incorporate cognitive techniques and behavioural strategies that can be used to help guide individuals through the Stages of Change. Decisional balance a derivation of the Decision Making Theory (Janis & Mann, 1977) reflects how an individual sees the costs (cons) and benefits (pros) of changing their behaviour. Basically an individual must perceive more benefits of changing their behaviour than costs before their attempts at behaviour change will be successful (Prochaska et al., 1994). Self-efficacy derived from the Social Cognitive Theory (Bandura, 1977) is another important construct of the Transtheoretical Models and the Stages of Change as it is also able to differentiate between each Stage of Change. Self-efficacy centres around one’s belief in their ability to effect a change in behaviour and that the change in one’s behaviour will lead to the desired outcome (King et al., 1992). For more information about these three constructs see Appendix A.
Therefore, the use of the stage criterion together with the three other constructs can provide a logical sequence on which to base an intervention to meet the needs of individuals (Prochaska et al., 1997). Furthermore, the TTM has the potential to maximise impact by allowing therapy to progress more rapidly as the therapist and the client can work together at the same Stage of Change*. Another advantage is that entire at risk populations can be defined and pro-actively targeted.

Whilst the TTM was initially developed by Prochaska & DiClemente (1982) to help understand how people stopped the addictive behaviour of smoking, it has been adapted to describe many other health behaviours (Prochaska et al., 1994). The model has been used successfully to describe a number of attitudes and patterns of health behaviour (Prochaska et al., 1997): including sun exposure, high fat diets (Plumme et al., 1999), mammography screening (Rakowski et al., 1992; Rakowski et al., 1999) weight control (Jeffery et al., 1999), colo-rectal screening, alcohol and drug use, coronary heart disease risk factors, anxiety and panic disorders, and unplanned pregnancy prevention (Prochaska et al., 1994). The adaptation of the TTM to these behaviours required relatively minor changes to reflect the unique aspects of each (Prochaska & Velicer, 1997). The Stages of Change have also been successfully adopted to physical activity, primarily through the work of Marcus and colleagues (Marcus, Selby et al., 1992; Marcus, Rossi et al., 1992; Marcus & Owen, 1992; Marcus & Simkin, 1993, 1994; Marcus et al., 1994; Marcus, 1995) which is discussed in further detail in the next Section.

2.7.2 Application of the Stages of Change to physical activity

Physical activity adoption is far from an ‘all or nothing’ response, since it may be adopted over a period of time (O’Connor, 1994). Therefore, the adoption of physical activity may be explained by forward progression through the Stages of Change (Marcus, Selby et al., 1992; Marcus, Rossi et al., 1992; Marcus, Rakowski et al., 1999-2000).

* It is a great source of resistance if the therapist is working at a different Stage of Change than the client is ready for (Prochaska & DiClemente, 1986; Prochaska & DiClemente, 1982) such as the action-orientated approach discussed in Section 2.8.
The application of the Stages of Change to physical activity has the potential to enhance the understanding of people’s attitudes towards physical activity and improve the design and delivery of effective interventions. More practical interventions can be tailored specifically to the needs of the sedentary and inactive sections of the community (Oldenburg, 1994; Donovan & Owen, 1994). Targeting interventions to the stages within the model ensures appropriate support can be given to the people within each Stage of Change (Vita & Owen, 1995). The five Stages of Change specifically defined in terms of readiness to adopt physical activity are:

1. Pre-contemplation (PC) includes people who are not physically active and do not intend to start (I won’t),

2. Contemplation (C) includes people who are not physically active but intend to start (I might),

3. Preparation (P) includes people who are physically active sometimes but not regularly, and intend to start in the near future (I will),

4. Action (A) includes people who are currently physically active on a regular basis but have been for less than 6-months (I am), and

5. Maintenance (M) includes people who are currently physically active on a regular basis and have been for more than 6-months (I have; Marcus & Simkin, 1993; 1994).

The initial research into adopting the Stages of Change to promoting physical activity was conducted in US work-sites*, where it was determined that an individual’s physical activity stage could be determined by self reported data (Marcus, Simkin et al., 1996). Subsequent analysis of 6-month follow-up data

*Research has shown that work-site health promotion programs have been somewhat effective in improving exercise behaviour of employees (King et al., 1988). However, most work-site programs tend to only attract the already active or those sufficiently motivated to change (Cox et al., 1981; Dishman, 1991). Therefore, work-site programs do not cater to the completely sedentary or irregularly active people in the working environment, nor do they impact on the community as a whole.
revealed four patterns of physical activity stage change. Individuals could be classified as either, stable sedentary, stable active, adopters or relapsers. Adopters increased their physical activity participation rates, relapsers decreased the amount of physical activity they did and the stable sedentary and stable active people did not change their physical activity status (Marcus, Simkin et al., 1996).

Gorely & Gordon (1995) began studying the usefulness of the physical activity Stages of Change in older Australians, using questionnaire items derived from the U.S. Items included the Stages of Change (Marcus, Selby et al., 1992), Processes of Change (Marcus, Rossi et al., 1992), Self-efficacy (Marcus, Selby et al., 1992) and Decisional Balance (Marcus, Rakowski et al., 1992). Gorely & Gordon (1995) reported no significant differences between the demographics of individuals presenting in each Stage of Change. However, more people in M were less likely to have dependent children. Not surprisingly individuals in the later stages (P, A & M) reported significantly more physical activity, with P being significantly less active compared to those in A and M. Despite using the validated 40-item Processes of Change questionnaire only five processes were evident in this sample (Gorely & Gordon, 1995). Nonetheless, consistent with Marcus, Rossi et al. (1992), people in PC tended to use the Processes of Change significantly less than those in the higher Stages of Change. This indicates that people in PC do very little to address their inactivity and ignore the potential consequences of their problem behaviour. Two cognitive processes of change, self re-evaluation and consciousness raising were more frequently used by those in P, A and M, indicating that even those in M continue to seek and look for reinforcement of their behaviour (Gorely & Gordon, 1995). Therefore, appears that the Stages of Change as applied to physical activity was also applicable to the Australian community.

Lee (1993) sought to describe the Stages of Change with respect to exercise behaviour by the type of people who presented in each Stage of Change by conducting a telephone interviews with 286 women aged between 50- and 64-years (mean age = 56.5 ± 4.2-years). Lee (1993) reported that subjects in PC were older, had less physical activity knowledge, perceived less family support and psychological benefits from participation, and rated exercise as less important than
giving up smoking than those currently engaged in exercise participation (Lee, 1993). Similarly, Marcus, Rossi et al. (1992) reported that most sedentary people were not interested in becoming physically active. Thereafter, Marcus & Simkin (1993) recommended that interventions should be specifically aimed at promoting physical activity to these people as they are the ones most likely to suffer from the consequences of their inactivity.

2.7.3 Using the Stages of Change to tailor physical activity interventions

As the need to promote physical activity became more pronounced, leading health promotion agencies (eg., National Heart Foundation) and researchers increased production of self-help print materials (see Section 2.6.2.6). While these materials provided useful information on the benefits of being active, how to get started and maintain an active lifestyle, they were based on the outdated action orientated approach. Therefore, the materials are not appropriate for people in the early Stages of Change PC, C and P (see Section 2.7.2). Mainly because there is a mismatch between physical activity advice given and the advice sedentary people require motivate them to consider physical activity. Consequently, there is a need tailor physical activity advice and information given to sedentary people through self-help print materials. One way of tailoring this information is to use the Stages of Change to guide appropriate intervention components.

For instance people typically in PC and C have been shown to perceive significantly fewer psychological benefits and family support, and more physical barriers to participation in physical activity compared those people in the A stage (Lee, 1993). These factors have been defined in terms of decisional balance. Decisional balance monitors the perceived gains (pros) against the perceived losses (cons) with regard to being physically active. Any person cannot be expected to change unless they expect the gains to supersede the losses (Gorely & Gordon, 1995). Therefore, the main aim of interventions targeting the early Stages of Change is to work towards tipping the decisional balance in favour of the benefits of adopting the behaviour. Self efficacy has also been shown to increase as an individual progresses through the Stages of Change (Marcus et al., 1992; Marcus & Owen, 1992). This is consistent with
previous literature, Gorely & Gorden, (1995), that reported that self efficacy tended to increase from PC to M, since PC tend to emphasise the negative factors involved with exercising, whereas those in the M stage emphasise the positive factors.

Marcus, Banspach et al. (1992) applied these principles and conducted a 6-week intervention trial using written materials tailored to one of three physical activity Stages of Change (C, P and A). The intervention trial involved a random sample of 236 participants selected from an initial 610 community volunteers. Results showed that participants who received the tailored materials became significantly more active over the 6-week follow-up period ($p < 0.01$). Up to 30% of the C moved into P, whilst 31% moved into A and an additional 61% of the P moved into A. However, this study had limitations in that participants were motivated volunteers, there was no control group, and the follow-up period was relatively short (Marcus, Banspach et al., 1992).

To further the research on tailored stage materials Marcus, Emmons et al. (1998) conducted a randomised controlled work-site study to compare the efficacy of self-help materials tailored to the individual’s stage of physical activity compared to standard self-help materials produced by the American Heart Association. Data were collected on 903 subjects at baseline and at a 3-month follow-up. Results indicated that the tailored intervention was significantly more effective than the standard materials. More of the tailored intervention group became adopters, and most of the standard intervention group relapsed or remained stable (Marcus, Emmons et al., 1997). This study was the first prospective, randomised controlled trial demonstrating the efficacy of a tailored intervention compared to the standard materials in promoting physical activity. Despite the study being limited by non-random sample selection and a short follow-up period, the results supported further investigation of the use of stage tailored materials as an effective method to promote the adoption of physical activity. However, studies that use a pro-actively recruited sample who are more representative of the population are required. Marcus, Emmons et al. (1998) also recommended that more intervention studies be conducted using different populations and settings before conclusive recommendations could be made.
A more recent intervention study, which used the Stage of Change (Marcus, Bock et al., 1998), examined the effectiveness of the previously tested staged targetted self-help materials (Marcus, Banspach et al., 1992; Marcus, Emmons et al., 1997) combined with more personal information on current personal activity participation and personal goals. This trial randomised inactive community volunteers to receive either the individually tailored stage-based intervention or the standard materials produced by the American Heart Association. All participants received four mailings of information (Baseline, 1-, 3- and 6-months). However, the effects of only three mailings were evaluated as there was no follow-up after the 6-month mailing. Results showed that the individually tailored stage-based group increased their physical activity levels more than the standard group at the 1-, 3- and 6-month follow-ups. This was despite the individually tailored stage-based intervention group being significantly less active than the standard intervention group at baseline. Furthermore, the individually tailored stage based group had significantly more subjects move into A by the end of the treatment compared to the standard group (Marcus, Bock et al., 1998). Therefore, an individualised, Stage of Change tailored intervention was more successful at enhancing physical activity levels in community volunteers than the standard self-help guides. However, despite the randomised design, this trial was again conducted on volunteer subjects who were sufficiently motivated to participate in the intervention and may have had preconceived ideas about increasing their activity levels. Nonetheless, the study reinforced the positive results reported by Marcus, Banspach et al. (1992) and Marcus, Emmons et al. (1998) on the use of stage-based self-help written materials to promote physical activity. However, again this stage based intervention research is limited by the lack of a pro-actively recruited random sample and control group who received no information at all.

2.8 Effective components of physical activity interventions

This review has provided evidence to support the concept that physical activity can be increased in sedentary populations and identified some common strategies in successful interventions. The most successful interventions primarily promoted physical activities that were home-based, convenient and enjoyable (Hillsdon et al., 1995). Dishman &
Sallis (1994) also emphasised that to get maximum adoption and maintenance to physical activity, the activity needs to be enjoyable, incorporate social support networks, minimal or easy access to facilities. They also reported that past participation, self-motivation, and self-efficacy along with a high intention to be active were also key factors in determining success of adopting physical activity.

From the reviews on individual and population focussed interventions (Sections 2.6.1 and 2.6.2) some important strategies became apparent that may be readily transferred to large-scale programs. Of particular importance were methods, which have been shown to be effective several different intervention trials. The more successful intervention programs are those which have used cognitive behavioural techniques to support behaviour change. These methods utilise behavioural, social and mediator change strategies to provide systematic approaches to behaviour change (Baranowski et al., 1998). Strategies including self monitoring, goal setting, relapse prevention training seem very important to promote early adherence to physical activity programs, whilst social support seems useful in promoting long-term change (Hunt & Hillsdon, 1996). Other useful cognitive behaviour strategies include feedback, reinforcement, behavioural reinforcement, incentives and prompts. However, since several strategies are usually tested at once it is difficult to determine which particular strategies are most important (Dishman & Sallis, 1991; Marcus & Forsyth, 1999).

Another important contribution to intervention research was the effectiveness of the lifestyle physical activity promotion programs. These studies demonstrated that significant improvements in physical activity and fitness levels could be achieved from lifestyle physical activity and were comparable to the improvements generated by more formal structured exercise programs. This was important research, as most people do not believe they can, or do not want to, exercise formally. Evidence suggested that people may accumulate similar benefits from lifestyle activity performed at a moderate intensity, which may be a more acceptable form of physical activity to be adopted by the general community.

Perhaps the most useful and adaptable intervention strategy to be evaluated was the TTM Stages of Change. The Stages of Change theory has been successfully used to construct face-to-face counselling sessions as well as self-help print materials tailored to
the needs of the individual. Furthermore, two studies have reported that print materials based on the Stages of Change led to greater improvement in reported physical activity behaviour than the non-tailored print materials (Mracus, Owen et al., 1998, Marcus, Emmons et al., 1997; Marcus, Bock et al., 1998). However, there has been a lack of controlled community trials evaluating the effectiveness of print-based interventions.

Based on the literature reviewed, the greatest limitation among the published studies to date has been the lack of randomised controlled trials conducted on non-volunteer samples. As such the research trials published to date cannot be considered to be generalisable to the whole population, and do not provide evidence for promoting physical activity at this level. If future physical activity objectives are to be met, effective large-scale interventions need to be established.

An important issue when designing a large-scale intervention is the issue of program delivery. Small-scale programs use a lot of face-to-face counselling and small groups, which are not practical for large-scale intervention strategies. Other strategies such as telephone support and mailed information have also been used to assist behaviour change in both small and medium scale interventions in closed environments (eg., work sites), but have not been used as the sole method of intervention. Hence, it is not known if a self-help print intervention delivered through the mail (without the additional face-to-face support or contact) is an effective intervention method. Therefore, an evaluation of a the self-help print intervention based on the Stages of Change, disseminated in a way that may be adopted to large-scale population-based interventions was required.

2.9 Summary

Many chronic diseases may be attributed to a lack of physical activity, such that physical inactivity is a major public health concern, costing millions of dollars each year. Moderate physical activity has been shown to reduce the incidence of all-cause mortality and is endorsed by world-wide experts as the criterion for promoting adequate amounts of physical activity that may be undertaken by most people. Although there are some risks associated with participation in physical activity, the benefits of participation in terms of health gain and quality of life far outweigh these risks.
Older people and those with low education and socio-economic backgrounds are less likely to be adequately active. Women are less likely to be vigorously active, and men are less likely to be moderately active. Various small and large-scale intervention strategies have been implemented in an effort to try and increase physical activity levels, including using GP’s to promote physical activity during consultations, work-site and mass media programs, environmental manipulation, home- and group-based programs and more recently the use of self-help print intervention strategies.

Based on the past successes and future potential of using the Stages of Change to promote physical activity, self-help print interventions have emerged. Mailing self-help print interventions has the potential to increase physical activity levels in large numbers of people. A large scale, randomised controlled trial of the effectiveness of a self-help stage-based print intervention delivered through the mail to a randomly selected community sample appeared to be an appropriate physical activity intervention to evaluate. Therefore, the design, implementation and evaluation of a self-help print intervention as a method to promote physical activity is the main aim of this thesis, and if successful this type of intervention may have the potential to have a direct impact on increasing physical activity levels across whole populations.
3. Development and Evaluation of the Self-help Print Intervention

Based on the literature review it was concluded that a self-help print intervention delivered through the mail to community members may have the potential to have a population health impact by promoting participation in moderate physical activity. Therefore, it was decided to evaluate the potential of such an intervention in a randomly selected community sample. Before the intervention could be implemented and evaluated, the self-help print materials had to be designed. This chapter describes the development and formative evaluation of the self-help print intervention.

3.1 Developing self-help print interventions

A large number of print materials are developed and distributed in Australia each year, costing considerable amounts of time and money (Paul et al., 1998). An evaluation of printed health advice revealed that very few printed materials are evaluated prior to being distributed, let alone the poor rate of monitoring their effect in the community (Paul et al., 1998). It was also revealed that only a few print materials actually utilise theoretically derived behavioural strategies to promote behaviour change (Paul et al., 1998). Therefore, a need was established for quality self-help behaviour change print materials to be produced and evaluated in the community setting.

Developing the self-help print intervention for this thesis was a collaborative process between the author and a second researcher*. The self-help print materials were developed using guidelines provided by the Transtheoretical model, which incorporates the Stages of Change (Prochaska & DiClemete, 1982; see Section 2.7). The Stages of Change have been successfully applied to physical activity (Marcus et al., 1992; see Section 2.7.2). Ideas were also incorporated from other behaviour

* The second researcher used the booklets to promote physical activity through General Practice.
change theories that have been found to have a concurrent relationship with the Transtheoretical model, including the Processes of Change, Decisional Balance and Self-efficacy (see Appendix A).

3.2 Developing the ‘Active Living’ booklets

The first step in developing the booklets was to collect and review current physical activity booklets, pamphlets and brochures available to the community. This helped to establish what the current standard of production of these types of materials was and what type of information was absent from the current materials that may be needed by the public to help them adopt a physically activity lifestyle. Booklets to promote physical activity using the Stages of Change have been previously evaluated in the U.S by Marcus, Banspach et al. (1992). These booklets were reviewed along with other physical activity resources from the Australian National Heart Foundation (NHF, 1997a; NHF, 1997b) and Quit smoking campaign booklets (which were also based on the Stages of Change; NSW Quit Campaign. (1997) before developing the present self-help print materials.

The second step in developing the self-help print intervention was to determine the structure of the booklets. Following numerous discussions with the co-author of the booklets on the content and structure of the booklets (see Section 3.1), and based on information collected from reviewing the previously published materials, it was decided that the booklets should:

1. be DL (21cm by 10cm) size so they could easily be mailed to individuals,

2. be multi coloured and use quality paper (150gsm) to portray a professional image,

3. be illustrated with photographs of people being physically active, as visual images have been shown to make written text easier to understand (Manning, 1991),

4. be endorsed by the NHF logo to enhance credibility of the information,
5. promote the current physical activity recommendation: “Every adult should accumulate at least 30 minutes of moderate physical activity on most, preferably all, days of the week.” (see Section 2.3),

6. advertise the series of booklets, so people receiving only one booklet could refer to the next booklet in the series as they progressed through the Stages of Change, and

7. include at least two case studies (one male and one female) reflecting on the problems and successes associated with starting and maintaining a physically active lifestyle, so that readers may identify with them and see being physically active as an option for themselves.

Although there are five Stages of Change (see Section 2.7) four booklets were developed, one for each of the three early Stages of Change, Pre-contemplation (PC), Contemplation (C) and Preparation (P)). Only one booklet was produced to represent the stages of Action (A) and Maintenance (M) stages as, theoretically, the only difference between these two stages is the length of time individuals have been participating in regular physical activity. Each booklet was aimed at a particular stage of change, providing information relevant to that stage and how to move on to the next stage. The main aim of each of the four booklets was:

1. Pre-contemplation: to introduce people to the ‘new message’, that is, the current physical activity recommendation (see Section 2.3) and to provide incentive for individuals to consider physical activity.

2. Contemplation: to encourage people to try some physical activity.

3. Preparation: to help people establish a habit of regular moderate physical activity.

4. Action & Maintenance: to encourage people to maintain an active lifestyle and help them prevent relapse.

The next step was to determine the title and content of each booklet. The four self-help booklets were broadly titled ‘Active Living’. The booklet sub-title and content outlines are presented in Table 3.1.
Table 3.1: Titles and content outlines for the ‘Active Living’ booklets

<table>
<thead>
<tr>
<th>Booklet Title</th>
<th>Content Outline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-contemplation:</strong></td>
<td></td>
</tr>
<tr>
<td>Have you heard the good news?</td>
<td>• emphasis on incidental physical activity; ‘every little bit counts’</td>
</tr>
<tr>
<td></td>
<td>• immediate benefits of physical activity</td>
</tr>
<tr>
<td></td>
<td>• decisional balance emphasising the pros of physical activity and how they relate to individuals</td>
</tr>
<tr>
<td></td>
<td>• suggests consideration of including physical activity in daily life</td>
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<tr>
<td></td>
<td>• case studies from people re-evaluating their views on physical activity</td>
</tr>
<tr>
<td><strong>Contemplation:</strong></td>
<td></td>
</tr>
<tr>
<td>Are you ready?</td>
<td>• emphasising shift from incidental physical activity to at least three 10-minute bouts</td>
</tr>
<tr>
<td></td>
<td>• short and long term benefits of physical activity</td>
</tr>
<tr>
<td></td>
<td>• how to overcome the top four to six barriers to being physically active, including lack of time, laziness/motivation, injury, not sporty, need rest, no company (Booth et al., 1995)</td>
</tr>
<tr>
<td></td>
<td>• tips on how to start being active (small steps, goal setting, rewards, etc)</td>
</tr>
<tr>
<td></td>
<td>• case studies from people who have tried being physically active and liked it</td>
</tr>
<tr>
<td><strong>Preparation:</strong></td>
<td></td>
</tr>
<tr>
<td>Take the step!</td>
<td>• positive reinforcement for starting to be physically active</td>
</tr>
<tr>
<td></td>
<td>• review benefits of physical activity</td>
</tr>
<tr>
<td></td>
<td>• tips to stay motivated (goal setting, self monitoring, feedback, rewards, routine development, variety, small increments)</td>
</tr>
<tr>
<td></td>
<td>• injury prevention</td>
</tr>
<tr>
<td></td>
<td>• relapse prevention; overcoming setbacks</td>
</tr>
<tr>
<td></td>
<td>• guide to developing a 6-week plan</td>
</tr>
<tr>
<td></td>
<td>• case studies from people establishing a regular routine</td>
</tr>
<tr>
<td><strong>Action &amp; Maintenance:</strong></td>
<td></td>
</tr>
<tr>
<td>Keeping in step!</td>
<td>• positive reinforcement for achieving an active lifestyle</td>
</tr>
<tr>
<td></td>
<td>• emphasis on 30-minutes of physical activity every day and additional benefits for doing more</td>
</tr>
<tr>
<td></td>
<td>• relapse prevention, tackle pitfalls, identifying potential problems and overcoming them</td>
</tr>
<tr>
<td></td>
<td>• motivation: goal setting, variety, setting a routine and sticking to it, cues and rewards</td>
</tr>
<tr>
<td></td>
<td>• case studies from people who have overcome a relapse</td>
</tr>
</tbody>
</table>
Australian physical activity experts critically reviewed the content outlines for each booklet and their subsequent drafts*. The first six drafts of each booklet were text only versions, with the sixth draft including photographic concepts. The sixth draft was circulated again to the Australian physical activity experts and one international expert† for critical analysis. Based on their suggestions minor modifications to the content and emphasis of the text were made. A seventh draft of each booklet was sent to a graphic designer to complete the layout of the booklets. Another three drafts of each booklet were then produced before 20 full colour copies of each booklet were produced for formative evaluation.

3.3 Formative evaluation of the ‘Active Living’ booklets

There are many factors to consider when developing print materials. In particular the materials attractiveness, comprehensibility, acceptability, personal involvement and persuasiveness (Hawe et al., 1990). Material credibility, length and visual impact also need to be considered (Ley, 1986, Hovland et al., 1953). Therefore, all these factors were considered before the ‘Active Living’ Booklets were produced on mass.

The ‘Active Living’ booklets were produced in full colour and formatively evaluated using focus group discussions. The aim of the focus groups was to determine the acceptability, attractiveness, comprehensibility, appeal, credibility and relevance of the booklets to the target audience. Prior to conducting the focus groups research ethics approval was obtained from the University of Wollongong Human Research Ethics Committee, with all evaluation and data management conducted according to the National Health & Medical Research Council Statement on Human Experimentation (NH&MRC, 1994).

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† Dr Bess Marcus Assistant Professor, Miriam Hospital & the Brown University School of Medicine: Rhode Island.
Eight focus groups were planned (four by the author of this thesis and four by the co-author of the booklets), two groups to evaluate each booklet. Focus Group 1 for the PC stage, Focus Group 2 for the C stage, Focus Group 3 for the P stage and Focus Group 4 for A and M stages. However, of the eight focus groups planned, four were conducted by the author of this thesis in the Illawarra and only three by the co-author of the booklets in Liverpool. The focus groups conducted in Liverpool are not presented in this thesis, as the author of this thesis did not conduct them. However, reference will be made to any data collected in the Liverpool focus groups’, which influenced the booklet design and/or content.

### 3.3.1 Recruitment of focus group participants

All focus group participants were volunteers, and had to be aged between 40 and 60 years of age. Seven different recruitment strategies were used to enrol volunteers in the focus groups in an effort get a variety of people involved in the groups, including people who were generally inactive. The recruitment strategies (listed below) were selected because most members of these groups and organisations were considered to be more likely to be aged between 40 and 60 years of age.

1. Letter drops advertising the focus groups, with the incentive of a free lunch (see Appendix B.1) were hand delivered to each office worker at the Wollongong City Council. Council workers were considered appropriate as most were aged over 40 years.

2. Personal telephone calls to participants in a local Illawarra physical activity event, the Move & Improve Challenge. This event was specifically targeted as Focus Group 4 needed people aged between 40 and 60 years who were already active to evaluate the ‘Keeping in Step’ booklet.

3. Local Illawarra community groups such as the Lions and Rotary Clubs were personally contacted and invited to be involved in the groups.

4. Letters and faxes advertising the focus groups and the free lunch were sent to four sections of the Illawarra Area Health Service,
5. Letter drops advertising the focus groups and the free lunch were delivered via internal mail to the Faculty of Behavioural Sciences academic and general staff at the University of Wollongong.

6. Newspaper advertising in the Public Notices section (see Appendix B.2).

7. Word of mouth advertising.

Despite 631 people being invited to be involved in the focus groups, only 52 people expressed a genuine interest in attending one of the groups (see Table 3.2). Nonetheless, these volunteer participants represented a good range of age, gender and socio-economic backgrounds.

Table 3.2: Recruitment of volunteer participants for the focus groups

<table>
<thead>
<tr>
<th>Recruitment Strategy</th>
<th>Potential Participants</th>
<th>Interested Participants</th>
<th>Allocated Group</th>
<th>Attended Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wollongong City Council</td>
<td>450</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2. Move &amp; Improve Challenge</td>
<td>30</td>
<td>10</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>3. Community Groups</td>
<td>60</td>
<td>15</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>4. Area Health Service</td>
<td>30</td>
<td>9</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>5. University of Wollongong</td>
<td>50</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6. Newspaper</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7. Other</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>631</td>
<td>52</td>
<td>43</td>
<td>34</td>
</tr>
</tbody>
</table>

The 52 volunteers were screened for their current stage of physical activity using the stage measure used by Marcus, Rossi et al. (1992) and allocated to the focus group aimed at evaluating the ‘Active Living’ booklet designed for their particular stage of change for physical activity*. After stage screening and group allocation, nine people were unable to attend the group they were allocated to leaving 43 people divided between the four focus groups.

* Group allocation was later confirmed using the stage algorithm developed by Booth et al. (1996; see Section 5.3.3), as this staging method was subsequently used throughout the rest of the thesis.
3.3.2 General focus group methods

The day before the scheduled focus group meeting, each participant was provided with a copy of the ‘Active Living’ booklet they were to evaluate so they could read the booklet prior to attending the group. The booklets were either hand delivered or posted to the participants, together with a covering letter, confirming the time and location of the focus group (see Appendix B.3).

All four focus groups were conducted between 12:30 pm and 1:30 pm, with a complimentary lunch and beverages provided to the participants. Upon arrival at the venue each participant was given a self-adhesive name tag (first name only) and then seated around a table. Before each focus group began a brief introduction was given on the purpose and aims of the focus group and the participants were informed of the need to tape record the discussion. Participants were then required to read and complete an informed consent form (see Appendix B.4).

After completing and returning the informed consent forms the tape recorder was turned on and the focus group discussion began. Initially the group was asked a broad based question on what they remembered most about the booklet they read. Questions then became more specific as the group discussed details of the booklet (see Appendix B.5 for exact questions asked of the group). Near completion of the focus group discussion, participants were asked to complete a short one page questionnaire which sought details on participant demographics, current exercise status and general opinions about the booklet (see Appendix B.6). All the information recorded from the taped discussion and questionnaires were treated anonymously. The questionnaire was required to gain a complete description of the group in terms of demographics to determine generalisability of the results, as well as confirm previously reported physical activity status and to rate the booklets on a five point Likert scale. Each tape recording of the focus group discussions was transcribed in full by the author of this thesis immediately after the focus group to ensure the mood and tempo of the discussion was accurately reflected in the transcription.
3.3.3 Focus group demographics results

Demographic characteristics of each focus group are presented in Table 3.3. Although no comparisons were to be made between groups, all participants were within the target age range and demographics of the people for whom the print materials were designed. It is important to note that whilst all group participants had some formal education, the groups may under-represent illiterate sections of the community, who would be unlikely to read the materials anyway.

Table 3.3: Focus group demographics

<table>
<thead>
<tr>
<th>Focus Group 1 Pre-contemplation</th>
<th>Gender: male n</th>
<th>Mean age yrs ± SD</th>
<th>Main language: English</th>
<th>Highest level of education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus Group 2 Contemplation</td>
<td>5</td>
<td>52.7 ± 8.8</td>
<td>8</td>
<td>2 TAFE</td>
</tr>
<tr>
<td>Focus Group 3 Preparation</td>
<td>5</td>
<td>49.0 ± 5.4</td>
<td>10</td>
<td>6 Year 10 School</td>
</tr>
<tr>
<td>Focus Group 4 Action &amp; Maintenance</td>
<td>3</td>
<td>49.1 ± 9.1</td>
<td>7*</td>
<td>4 TAFE/Trade</td>
</tr>
</tbody>
</table>

*main language was Hungarian for one group member.
# main language was Serbian for one group member.

All participants in Focus Group 1 indicated on their questionnaire that they intended to do more physical activity in the near future, which technically makes them ineligible for the PC group. However, before their involvement in the focus group they had indicated they were not currently active and did not intend to be in the near future. The fact that they completed the focus group questionnaire after the group discussion may have influenced their responses with regard to their intention to be more active in the future. Hence, the participants may have been motivated by their involvement in the focus group to change their intention to become more physically active in the near future. Six participants in Focus Group 2 were correctly staged, based on their current physical activity status. The other two participants had recently begun walking in the week prior to the focus group meeting, and intended on doing more physical activity in the future. Therefore, all participants were eligible for the contemplation group. All of the participants
in Focus Group 3 were experimenting with physical activity but had not established a routine, therefore, were allocated to the correct group. Of the participants who participated in Focus Group 4 all were currently physically active, some of who were in the M stage. Therefore, all the participants were allocated to the correct group.

3.3.4 Results from the focus group questionnaire

Data collected from the questionnaire about the booklets are presented in Table 3.4. The A and M booklet rated the least favourable in the focus group questionnaire. Group means indicated that most of the participants found the booklet to be too long, and not practical for their needs. The P and the C booklets rated positively in all five categories, indicating that they were well received by the groups. Data from the PC group indicated that, as a whole the group thought the booklet was also too long, but rated it positively in the other four categories.

Table 3.4: Focus group evaluation of ‘Active Living’ booklets*

<table>
<thead>
<tr>
<th>Focus group 1 n = 7</th>
<th>Interest</th>
<th>Length</th>
<th>Encouraging</th>
<th>Information</th>
<th>Practicality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.9</td>
<td>3.2</td>
<td>2.1</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Focus group 2 n = 7</td>
<td>2.4</td>
<td>2.3</td>
<td>2.0</td>
<td>3.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Focus group 3 n = 10</td>
<td>1.9</td>
<td>2.4</td>
<td>1.8</td>
<td>2.0</td>
<td>1.8</td>
</tr>
<tr>
<td>Focus group 4 n = 8</td>
<td>3.1</td>
<td>4.3</td>
<td>3.1</td>
<td>3.5</td>
<td>4.4</td>
</tr>
</tbody>
</table>

* Data presented as group mean based on the following five point Likert Scale 1 to 5
  Interest: 1 interesting to 5 not interesting; Length: 1 too short to 5 too long
  Encouraging: 1 encouraging to 5 discouraging; Information: 1 informative to 5 not informative; Practical: 1 practical to 5 not practical

3.3.5 Transcript data analysis

Transcript data were summarised using the cut and paste technique described by Stewart & Shamdasani (1990) and thematically analysed, to define any modifications the booklets required. The audio-tapes and data were kept secure in the Department of Biomedical Science at the University of Wollongong. Results of the transcript data analysis are presented in the following Sections 3.3.5.1 to
3.3.5.1 Focus group 1: Pre-contemplation

The Focus Group 1 discussion indicated that the booklet needed to be "shorter and sharper". Some members of the group were excited by the new physical activity recommendation (see Section 2.3); "I think that's the sort of message that I can see in it, but they are saying 'look its not exercise as such its just doing something different.'" (male claims officer, 50 years: Focus Group 1, line 216-7), and, "I thought the whole brochure was about the message of it being easy to do." (female health worker, 46 years: FG4, line 25).

The booklet was considered suitable for people of non-English speaking backgrounds, however: "It is very easy to understand but also I think that pamphlets should be translated in to different languages. That's my opinion and it would be very easy to translate and, I, I think it should be done." (female health worker, 48: years: Focus Group 1, line 121-3). However, this suggestion was not within the scope of this study, but remains an important consideration for future interventions.

Several group members suggested that information on diet should be included into the booklet. However, one group member stated why we chose not to include diet: "But then you are trying to emphasise two things." (female shop manager, 53 years: Focus Group 1, line 172), which can be more overwhelming than trying to change one behaviour at a time.

Overall Focus Group 1 comments were positive about the booklet after suggesting some minor changes. The groups’ suggestions were acted upon where appropriate and were filtered throughout the other booklets if required. The main discussion points and action taken from Focus Group 1 are presented in Table 3.5.
Table 3.5: Summary of focus group 1: Pre-contemplation

<table>
<thead>
<tr>
<th>Themes</th>
<th>Action Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus group 1</strong></td>
<td></td>
</tr>
<tr>
<td>• mixed comments about cover; liked the title</td>
<td>• collage of photographs</td>
</tr>
<tr>
<td>• 2 comments that the case studies needed to be more fun</td>
<td>• modified case studies</td>
</tr>
<tr>
<td>• 5 comments on length of paragraphs</td>
<td>• removed words, used point form</td>
</tr>
<tr>
<td>• 3 comments on colour</td>
<td>• lighten yellow colour inside</td>
</tr>
<tr>
<td>• 5 comments on including diet information</td>
<td>• not appropriate</td>
</tr>
<tr>
<td>• 2 comments on including a diary</td>
<td>• not appropriate at this stage, included in P booklet</td>
</tr>
<tr>
<td>• 3 comments on interpreting into other languages</td>
<td>• not feasible</td>
</tr>
<tr>
<td>• 4 comments on referral</td>
<td>• telephone numbers included</td>
</tr>
<tr>
<td>• 2 comments on not noticing there was a series of booklets</td>
<td>• made font bigger</td>
</tr>
</tbody>
</table>

3.3.5.2 Focus group 2: Contemplation

The most consistent comment about the C booklet from the group was, the participants did not think the booklet provided any new information “they had heard it all before”. However, the group liked the idea of making physical activity a part of everyday life and they thought the emphasis should be on improved quality of life: “yeah and it really would emphasise that it [physical activity] was for everybody and be appealing.” (male retired BHP computers, 66 years: Focus Group 2, line 484).

Positive feedback was given with respect to the case studies presented in the booklet. “I like the fact that you used a different type of style and the person is actually speaking. Its good and you can sort of relate to someone saying something.” (male dental administration, 49 years: Focus Group 2, line 345-6). There were, however, some inconsistencies within the case studies pointed out by the group, which were corrected prior to the final print.

The yellow background colour used within the booklet was criticised by the group and lighter shades were suggested to increase readability of the text: “but
all my advertising and training is when you put a colour as a behind as a background, you will never get anything easier to read that black on white never.” (female advertising consultant, 59 years: Focus Group 2, line 320-2).

Therefore, lighter shades and smaller graphics were used to make the text stand out more.

As with other Focus Groups, Focus Group 2 suggested that a contact phone number be included in the layout: “I think you should have a contact number, yeah I would like to know more about....” (female housewife, 53 years: Focus Group 2, line 633-4).

Focus Group 2 seemed to have a lot more questions than answers and were searching for the solution to the problem of a lack of motivation. One participant summed him impression of the booklet as: “it doesn’t actually give you any motivation to do this [physical activity]. Its like you got to have your own motivation to do things.” (male gas fitter semi retired, 56 years; Focus Group 2, line 207-8). The group suggested that for someone to become motivated they had to be scared into it. One participant had tried activity because his doctor told him ‘he had to or he would die’. However, his motivation was short lived and he was now sedentary again. The comments and suggestions made by Focus Group 2 were incorporated into the C booklet (see Table 3.6) and where relevant, to the other booklets as well.

Table 3.6: Summary of focus group 2: Contemplation

<table>
<thead>
<tr>
<th>Themes</th>
<th>Action Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus group 2</td>
<td></td>
</tr>
<tr>
<td>• 5 comments on the quality and range of photographs</td>
<td>• wider range of professional photographs used</td>
</tr>
<tr>
<td>• mixed comments on including a diary or chart to gauge physical activity</td>
<td>• not suitable for C booklet, included in P booklet</td>
</tr>
<tr>
<td>• mixed comments on case studies</td>
<td>• modified case studies</td>
</tr>
<tr>
<td>• 2 comments on including diet information</td>
<td>• not appropriate</td>
</tr>
<tr>
<td>• 5 comments about graphics and colour behind the text</td>
<td>• lightened yellow colour behind text (in all booklets)</td>
</tr>
<tr>
<td>• 3 comments on generalising the cover</td>
<td>• collage of photographs</td>
</tr>
</tbody>
</table>
3.3.5.3 Focus group 3: Preparation

The discussion within Focus Group 3 was very positive with most participants expressing they needed something like the ‘Active Living’ booklet to help get them active again: “I think something happens around, around our age that you either become sedate through your work or your lifestyle. You tend to give away the more active sports that you’ve probably played in your younger days, you know like squash and football, things like that (male area co-ordinator, 43 years: Focus Group 3, line 13-16). All of the participants thought the messages being presented would “give people the incentive” to try and do more physical activity.

The only negative comments about the booklet were similar to the negative comments about the A and M booklet (see Section 3.3.5.4). The quality of the photographs was discussed: “Um a lot of the photographs in the brochure I find it a bit um amateurish type.” (male manager, 54 years: Focus Group 3, line 219). Therefore, a professional photographers support was obtained. The lack of a referral phone number was again raised: “They need a phone number or something.” (female secretary, 52 years: Focus Group 3, line 687), and was, therefore, included on the back cover.

Other comments were made about the front cover and the fact it needed to appeal to a wider audience. It was suggested that: “perhaps something even a collage of different things happening, rather than one picture of someone playing tennis up on the front page.” (female secretary, 45 years: Focus Group 3, line 469-70), could be used.

Participants felt the sections in the booklet dealing with relapse prevention were important and useful: “I think that page dealing with set backs is very important. People don’t always acknowledge that this is going to happen and it has happened to all of us umm... then it can also encourage you to make new short term goals. That’s very, very important and I really like that page.” (female secretary, 45 years: Focus Group 3, line 381-6). A summary of the main discussion points and action taken from Focus Group 3 are presented in Table 3.7.
3.3.5.4 Focus group 4: Action & Maintenance

Participants in Focus Group 4 questioned the usefulness of the booklet for already active individuals. The main discussion points and action taken from Focus Group 4 are presented in Table 3.8, and the main themes discussed below.

Suggestions included to have more graphical and scientific information on training and heart rate levels: "I look for specifics like facts or data maybe a graph that shows how your actual health or fitness levels or well being goes down if your level of activity decreases or how your health and well being increases when your fitness levels increase, ....... something visual too, not just words." (female librarian, 38 years: Focus Group 4, line 77-82).

The participants in Focus Group 4 also recommended that a contact phone number should be provided on the back of the booklet to allow individuals interested in obtaining more information to do so: "yeah I sort of found that missing and the Heart Foundation, I would have liked their phone number on that. If you wanted any information about, you know, blood sugar levels when you exercise or heart rate levels when you exercise and all that sort of stuff (female health worker, 47 years: Focus Group 4, line 98-101).

Participants also thought that the quality and type of photographs included in the booklet could be improved: "I think the photos need a bit more clarity than
what they do." (male retired Marine Engineer 59 years: Focus Group 4, line 454-5).

Table 3.8: Summary of focus group 4: Action and Maintenance

<table>
<thead>
<tr>
<th>Themes</th>
<th>Action Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus group 4</td>
<td></td>
</tr>
<tr>
<td>• 6 comments on the cover, including</td>
<td>• photograph replaced by collage and colour</td>
</tr>
<tr>
<td>changing the photos, colour and title</td>
<td>changed</td>
</tr>
<tr>
<td>• 11 mixed responses to the case studies,</td>
<td>• photographs replaced</td>
</tr>
<tr>
<td>most negative comments about the photos</td>
<td></td>
</tr>
<tr>
<td>• 6 comments on length and use of words,</td>
<td>• cut down words, added graphs</td>
</tr>
<tr>
<td>suggested use of graphs</td>
<td>• simpler words and more photographs</td>
</tr>
<tr>
<td>2 comments on comprehensibility for</td>
<td></td>
</tr>
<tr>
<td>those people from non-English speaking</td>
<td></td>
</tr>
<tr>
<td>backgrounds</td>
<td></td>
</tr>
<tr>
<td>• 8 comments on referral to other service</td>
<td>• inclusion of phone numbers</td>
</tr>
<tr>
<td>• 2 comments on having a mission statement</td>
<td>• not warranted</td>
</tr>
<tr>
<td>• 8 comments on emphasising health benefits</td>
<td>• health benefits covered</td>
</tr>
<tr>
<td>• 9 comments on poor photo quality</td>
<td>• professional photographs used</td>
</tr>
<tr>
<td>• 3 comments on unsuitable for the active</td>
<td>• inclusion of heart rate training graphs</td>
</tr>
<tr>
<td>people</td>
<td></td>
</tr>
</tbody>
</table>

The group praised the inclusion of the two case studies: “I quite liked that because you took comments from people. (female health worker, 47 years: Focus Group 4, line 237-8); “yes the fact that ‘she’ had stopped and started again that was, that was useful I could relate to that’s quite typical there is always something that comes up that won’t allow you to be active” (female librarian, 38 years: Focus Group 4, line 33-5).

Participants also appreciated the section on relapse prevention, finding it useful; “I thought the beating the barriers was very informative and very good.” (female draftsperson, 41 years: Focus Group 4, line 59).

After focus group evaluation the ‘Active Living’ booklets underwent further evaluation, which is presented in the following sections.
3.4 Readability analysis

Readability is one of the most important considerations when developing written materials (Ley, 1986) as all too often public health and health promotion print materials are written at a level that is much higher than the average consumers reading age (Cardinal & Sachs, 1992). The higher reading age believed to be required to comprehend currently available physical activity resources suggests the materials are directed towards more highly motivated or well educated individuals. Therefore, it seems a waste of time to continue to produce materials that cannot be read or understood by the less educated and people from lower socio-economic standing, who are most in need of the education materials (see Section 2.5.1). However, Cardinal & Sachs (1992) also reported that it may be the exercise language itself is above the national readability average, because the word ‘exercise’ itself has three syllables. Nonetheless, Cardinal and Sachs, (1992) encouraged writers of health promotion literature to test the readability of materials during the developmental stage and market test the materials with the desired audience before publishing materials in bulk. Therefore, to ensure the ‘Active Living’ print materials were user friendly and easy to comprehend the readability of the booklets was assessed using a accepted readability formula.

Readability formulas provide an objective and quantifiable measure of a texts required reading age. The SMOG formula* (McLaughlin, 1969) is most often used in the literature to determine readability in terms of an appropriate reading age required to comprehend the text. Where several formulas have been tested, the SMOG formula results often represent the mean of all other formulas used (Cardinal & Sachs, 1992). Therefore, the SMOG formula was used to assess the readability of the self-help booklets.

The ‘Active Living’ booklets were SMOG tested for readability using the method described by Hawe et al. (1990), whereby the first, middle and last pages of each

* SMOG is the actual name of the formula, not an acronym.
booklet was tested. All polysyllabic (three or more syllables) words were counted. The SMOG results for the ‘Active Living’ Booklets are shown in Table 3.9.

The SMOG grade determined for each ‘Active Living’ booklet was 9. Hawe et al. (1990) reported a SMOG grade 11 for an Australian magazine ‘New Idea’ which is easily read and understood by adult Australians. Goyan (1985) reported that not much reading development occurs after 13 years of age, rather word and worldly experience heightens individuals reading ability. Furthermore, Cardinal & Sachs (1992) reviewed 54 written resources aimed at promoting physical activity and exercise, and reported a mean readability rating (SMOG rating) between 7 to 16 (mean of 11.3 ± 1.9). Therefore, the ‘Active Living’ booklets were written at a level believed to be practical and suitable in terms of readability for their Australian audience.

Table 3.9: SMOG readability analysis of the ‘Active Living’ booklets

<table>
<thead>
<tr>
<th>Booklet</th>
<th>1st section</th>
<th>2nd section</th>
<th>3rd section</th>
<th>SMOG grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Living: Have you Heard the Good News?</td>
<td>20/10</td>
<td>11/10</td>
<td>9/10</td>
<td>40/30 = 9</td>
</tr>
<tr>
<td>Active Living: Are you Ready?</td>
<td>15/10</td>
<td>11/10</td>
<td>6/10</td>
<td>32/30 = 9</td>
</tr>
<tr>
<td>Active Living: Take the Step!</td>
<td>14/10</td>
<td>9/10</td>
<td>10/10</td>
<td>33/30 = 9</td>
</tr>
<tr>
<td>Active Living: Keeping in Step</td>
<td>16/10</td>
<td>10/10</td>
<td>13/10</td>
<td>39/30 = 9</td>
</tr>
</tbody>
</table>

3.5 Content analysis

After incorporating modifications suggested by the formative testing, the four ‘Active Living’ booklets were content analysed for the use and flow of the stages and

* The sum of polysyllabic words is calculated is then divided by the number of sentences counted. This number was then multiplied by 30 to get an estimate of words counted per 30 sentences. The nearest perfect square is determined and its square root calculated. Add three to the square root and this is the SMOG grade. The SMOG grade is equivalent to the reading age necessary to ensure comprehension of the text (McLaughlin, 1969). Put simply, text with more polysyllabic words requires a greater reading age to comprehend the meaning of the text.
Processes of Change*. The content of each booklet was determined by classifying sections of the booklet according to the process of change they primarily promoted. The two booklets aimed at PC and C individuals mainly used the experiential processes, which is consistent with suggestions made in previous research (Gorey & Gordon, 1995; Marcus, Rossi et al., 1992). Whereas, the other two booklets (aimed at the P and A & M) used more behavioural processes of change, again consistent with suggestions made by previous research (Gorey & Gordon, 1995; Marcus, Rossi et al., 1992; see Table 3.10).

Table 3.10: Use of the Processes of Change in the 'Active Living' booklets

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>Stage Booklet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consciousness Raising</td>
</tr>
<tr>
<td>1. PC</td>
<td>7</td>
</tr>
<tr>
<td>2. C</td>
<td>4</td>
</tr>
<tr>
<td>3. P</td>
<td>2</td>
</tr>
<tr>
<td>4. A &amp; M</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Counter-Conditioning</th>
<th>Stimulus Control</th>
<th>Helping Relationships</th>
<th>Self Liberation</th>
<th>Reinforcement Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PC</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. C</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. P</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>4. A &amp; M</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation; C = Contemplation; P = Preparation; A = Action and M= Maintenance

The contents of the four booklets were also analysed in terms of specific physical activity recommendations. Consistent with the theory behind the Stages of Change the physical activities recommended within the booklets moved from more moderate

* The Stages of Change incorporates 10 Processes of Change. Individuals use the Processes of Change differently depending on which Stage of Change they are in (see Section 2.8.2). The first five (cognitive) processes are more likely to be used by individuals in the early Stages of Change. The second five (behavioural) processes are more likely to be used by individuals in the later Stages of Change. Definitions of the 10 processes of change can be found in Appendix A.
incidental activities in the first booklet to more vigorous planned activities in the last booklet. There was a wide range of activities suggested both in written and photographic form in each booklet (see Table 3.11).

### 3.6 Comparative analysis

The ‘Active Living’ booklets produced for this self-hep intervention were designed using the ‘Jump Start to Health’ (JSH) booklets* as a guide. A comparison between the two sets of booklets was conducted to provide evidence as to why a new set of booklets was produced for Australian adults and to broadly support the stage based structure of the ‘Active Living’ booklets with the standard set by the ‘Jump Start to Health’ booklets.

#### Table 3.11: Tally of the promotion of specific physical activities in the booklets

<table>
<thead>
<tr>
<th>Booklets*</th>
<th>Walking</th>
<th>Mow lawns</th>
<th>Gardening</th>
<th>Swimming</th>
<th>Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PC</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>2. C</td>
<td>15</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3. P</td>
<td>14</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4. A &amp; M</td>
<td>4</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage Booklets</th>
<th>Incidental Activity</th>
<th>Dancing</th>
<th>Gentle Exercise</th>
<th>Golf</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PC</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. C</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3. P</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4. A &amp; M</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation; C = Contemplation; P = Preparation; A = Action and M= Maintenance

including written information and photograph references

* The ‘Jump Start to Health’ booklets were the first set of physical activity promotion booklets based on the Stages of Change produced in the U.S by Marcus and colleagues.
The ‘Jump Start to Health’ booklets were produced in three colours (green brown and black), using cartoon kangaroo characters doing a variety of physical activities, there were between 5 and 7 active kangaroo characters per booklet including the cover picture (see Figure 3.1a). In comparison the ‘Active Living’ Booklets were produced in full colour and used a collage of three photographs of actual people being active on the cover (see Figure 3.1b) as well as an additional four to seven other photographs of physical activities throughout the booklet, (also see Appendix C for a copy of the ‘Active Living’ booklets).

Table 3.11 details the sub-titles given to each of the booklets in both series. The ‘Jump Start to Health’ series included five booklets aimed at each of the five Stages of Change, and were approximately A5 size. Whereas, the ‘Active Living’ series included four booklets, (as a combined A and M booklet was produced, see Section 3.2) and were DL sized to fit into a standard envelope. The ‘Jump Start to Health’ booklets were quite verbose in content with the number of pages per booklet ranging from 16 to 20 pages compared to 8 to 12 pages in the ‘Active Living’ booklets (see Table 3.12). Hence it would take more time to read and understand the information provided in the ‘Jump Start to Health booklets’.

Figure 3.1: Visual comparison of the a) Jump Start to Health booklets and b) Active Living booklets
Table 3.12: Comparison between the previously evaluated ‘Jump Start to Health’ booklets and the ‘Active Living’ booklets

<table>
<thead>
<tr>
<th>Series Title</th>
<th>Booklet 1 No pgs</th>
<th>Booklet 2 No pgs</th>
<th>Booklet 3 No pgs</th>
<th>Booklet 4 No pgs</th>
<th>Booklet 5 No pgs</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Jump Start to Health</em></td>
<td>Do I Need this?</td>
<td>Try it, you’ll like it</td>
<td>I’m on my way</td>
<td>Keep it going</td>
<td>I won’t stop now</td>
</tr>
<tr>
<td>‘Active Living’</td>
<td>Have you heard the good news?</td>
<td>Are you ready?</td>
<td>Take the step</td>
<td>Keeping in step</td>
<td>8</td>
</tr>
</tbody>
</table>

* Marcus et al. (1992).

Further comparison between the two series of booklets was conducted in terms of the use of statements and items related to the Processes of Change (see Table 3.13). This comparison showed that the ‘Active Living’ booklets were indeed comparable to the ‘Jump Start to Health’ booklets in terms of the use of the Processes of Change. Both sets of booklets followed the theory behind the use of the Processes of Change (see Appendix A, Section A.1) by highlighting the cognitive Processes in the early booklets and the behavioural Processes in the latter booklets.

Table 3.13: Comparison of the use of each of the processes of change used in the ‘Jump Start to Health’ and the ‘Active Living’ booklets

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>Booklet 1 JSH</th>
<th>Booklet 1 AL</th>
<th>Booklet 2 JSH</th>
<th>Booklet 2 AL</th>
<th>Booklet 3 JSH</th>
<th>Booklet 3 AL</th>
<th>Booklet 4 JSH</th>
<th>Booklet 4 AL</th>
<th>Booklet 5 JSH</th>
<th>Booklet 5 AL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness Raising</td>
<td>12</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>10</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Dramatic Relief</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Social Liberation</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Counter-Conditioning</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Helping Relationships</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stimulus Control</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Reinforcement Management</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Self Liberation</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

* ‘Jump Start to Health’ booklets
# ‘Active Living’ booklets
Therefore, the ‘Active Living’ booklets were shown to be comparable to the previously evaluated ‘Jump Start to Health’ booklets in terms of their Stage based content and design. The fact the ‘Jump Start to Health’ booklets were designed in the U.S for American adults, made them unsuitable for dissemination to Australian adults. Therefore, the four colourful, succinct ‘Active Living’ booklets produced and formatively evaluated as part of this thesis were considered to be more appropriate for distribution to Australians’.

3.7 Summary

After formative evaluation, and content analysis the ‘Active Living’ booklets were produced as a set of four attractive, usable self-help print booklets, which were comparable to previously evaluated Stage based booklets and considered suitable for dissemination to Australian adults. Thereafter, the effectiveness of the ‘Active Living’ self-help print intervention as a useful physical activity intervention was evaluated and is reported in the remainder of this thesis.

After the self-help print intervention booklets were developed optimal methods of evaluating the efficacy of the self-help print intervention had to be identified. As the main aim of the thesis, was to promote moderate physical activity to large community samples, the evaluation strategies had to focus on how to accurately and reliably measure physical activity participation before, during and after the self-help print intervention was implemented. This chapter describes a variety of physical activity evaluation techniques and highlights the most appropriate method to evaluate physical activity in large community samples.

Physical activity is a very complex behaviour that can be characterised in many different ways, making accurate assessment of large, community samples difficult (Haskell et al., 1992). Physical activity includes traditional sport and exercise, any leisure time activity, as well as any occupational or household activity. These factors combine to ensure that there is no ‘gold standard’ of physical activity assessment available (Blair, Haskell et al., 1985). Nonetheless, there are a variety of different forms of physical activity assessment, including:

1. physiological measures of fitness, which involve laboratory or field based tests,
2. mechanical/electronic measures of actual physical activity, which report the amount of actual movement performed, or
3. self-report measures of physical activity, which can be based on actual or usual participation in physical activity.

An important consideration when determining the most appropriate method for assessing physical activity depends on the type of research being conducted and the hypotheses being tested. Hence the advantages and disadvantages of each of the three above-mentioned measurement methods are discussed in subsequent sections.

* See the List of Definitions, the front section of the thesis, page xxxiii.
4.1 Physiological measures of physical activity

Physiological measures of physical activity are usually used to monitor performance, as these measures tend to more accurately assess physical fitness and/or performance. There are a wide variety of assessment tools that can be used depending upon which aspect of fitness or performance is being evaluated (strength, flexibility, body composition, endurance, motor skills or cardio-respiratory fitness). As this thesis is primarily concerned with physical activity as it relates to health and disease prevention, only measures of cardiorespiratory fitness will be reviewed.

Traditionally the maximal oxygen uptake assessment (VO2 max) has been used as the standard measure of cardio-respiratory fitness. This assessment requires highly trained technicians and sophisticated equipment, as well as considerable time, cooperation and effort from the individual being assessed (who is required to either cycle or run on a treadmill to exhaustion). These factors alone make the use of this test unsuitable for large-scale studies (>200 subjects), in terms of cost and time involved in administering the test. Bouchard & Shepherd (1994) reported that except for performance-based research there was no need to do maximal exercise testing with middle-aged and older adults.

Another valid measure of cardio respiratory fitness is the sub-maximal VO2 (sub-max) test, which is a more participant friendly version of the VO2 max test. However, the sub-max test also needs to be conducted in a controlled laboratory environment, using specialised equipment, and it also consumes a lot of time and effort for both researcher and participants alike (Haskell et al., 1992) making this test unsuitable for large samples.

While the use of the above mentioned physiological measures may add to the validity of the physical activity measure they require motivated subjects, who are prepared to undergo intensive laboratory based tests. Therefore, these tests are neither appropriate nor practical for a large sample. Furthermore, given the motivation level required from study participants, using such methods may also compromise the aim of the intervention study, as the evaluation method itself becomes an intervention (Kohl et al., 1988; Owen et al., 1987), by prompting participants to increase their activity simply to get a better score on follow-up evaluations. Therefore, for the present thesis an alternate measure of physical activity was necessary, which
required less participant commitment and would not produce a pseudo intervention effect.

4.2 Mechanical/electronic measures of physical activity

The amount of physical activity performed can be measured using mechanical (pedometer) and electrical (accelerometer) motion sensors. Motion sensors are attached to the person (usually worn on a belt around the waist), and can objectively assess physical activity.

Mechanical pedometers may be attached to the ankle, and work by recording impulses generated by the foot impacting with the ground (Meijer et al., 1991; Meijer et al., 1989). That is, pedometers count the number of steps the wearer takes. Pedometers have been shown to be useful measure of physical activity (walking in particular) in large free-living samples (Bassett et al., 1996; Sequeira et al., 1995). Pedometers have also been used to evaluate interventions’ which promoted walking a minimum number of steps each day (Yamanouchi et al., 1995). The success of the pedometer as an intervention, questions the use of the device as a simple measurement tool that will not invoke an intervention response from study participants. It has also been reported that pedometers tend to underestimate the amount of physical activity undertaken at slow speed (walking) and can over estimate activity undertaken at high speed (running; Ainsworth et al., 1994). Furthermore, pedometers can suffer from large intra- and inter-instrument variability making them unsuitable for large-scale studies (Bassett et al., 1996; Haskell et al., 1992). Pedometers are also unable to reflect the intensity of the activity performed and, therefore, cannot be used to estimate the energy cost of activity (Meijer et al., 1991). Subsequently, pedometers are not useful for assessing changes in physical activity in large community samples, rather only a useful gauge of step taken or distance covered.

Electronic motion sensors such as accelerometers measure the amount of movement performed during physical activity based on the acceleration and deceleration of the body. Accelerometers have become popular over recent years due to their objectivity and convenience. The Computer Science and Applications (CSA) monitor has been shown to accurately predict energy expenditure during laboratory based treadmill running and walking in children (Trost et al., 1998) and adults (Freedson et al.,
1998), but tend to over predict energy expenditure in field tests of overland walking at slow, moderate and fast walking speeds (Gordon et al., 1999). The inaccuracies reported in field studies can lead to the misclassification of energy expenditure estimates (Rorabaugh et al., 1999).

Furthermore, complex physical activities such as golf, domestic cleaning, lawn and garden care involve much more bodily movement than simple acceleration and deceleration. A field-based study analysed the abovementioned activities using the CSA monitor and TriTrac® accelerometers and reported the devices tended to underestimate the energy expenditure of these activities (Miller et al., 1999) and other lifestyle activities (mowing, raking shovelling, vacuuming, sweeping and stacking) by over 40% (Welk et al., 1999). Morgan et al. (1999) also reported that the TriTrac provided misleading results when used in the field to estimate moderate intensity physical activity. Furthermore, Jones et al. (1999) reported that the data obtained from the CSA accelerometer differed significantly depending on where the device was placed on the hip (anterior axillary, mid axillary or posterior axillary). Therefore, it seems that accelerometers are accurate in well controlled laboratory studies, but are not recommended in lifestyle activity based studies conducted in the field, because the accuracy of the devices were limited by the type of activity performed and environment in which the measures were taken (Welk et al., 1999).

Nonetheless another accelerometer ‘Caltrac’ was reported to as showing a strong, significant association with the 7-day self-report physical activity recall questionnaire (Miller et al., 1994). However, the authors concluded that the recall questionnaire was a quicker, easier, less expensive option suitable for use in large population samples (Miller et al., 1994).

Other electronic sensing devices, such as heart rate monitors can monitor the work performed by the heart rather than bodily movement itself. However, heart rate monitors may be prone to overestimating heart rate during times of stress and emotional unrest. As well the heart rate response to physical activity is dependent upon physical fitness, medication, and fatigue (Baranowski 1988). Nonetheless,
heart rate monitors have been shown to accurately record heart rate during rest and physical activity up to moderate intensity, but not during activity performed at higher intensities where their accuracy diminished (Terbizan et al., 1999). These heart rate monitoring devices can also be cumbersome and uncomfortable for the participant, who has to ensure they are wearing and using the instrument correctly during the physical activity. The accuracy of heart rate monitors can also be affected by several other electronic devices such as computers and microwaves, which can result in lost data (Haskell et al., 1992). These factors combined make using heart rate monitors unsuitable for use in large-scale community research trials, but are a potentially useful measure of physical activity in samples of less than 50 participants. Therefore, movement counters and heart rate monitors are not considered to be a practical measure of physical activity in large-scale population samples, due to the lack of validity data available. Furthermore, the costs involved in using these types of equipment to measure physical activity in large samples cannot be justified. In addition, these types of equipment are only accurate in well controlled lab-based studies and require considerable time to calibrate at the beginning, during and after the trial to make sure the devices were comparable. Consequently, the high degree of participant co-operation and researcher effort required does not make these devices useful for large-scale studies (Haskell et al., 1992).

4.3 Self-report measures of physical activity

Time and monetary restraints in public health research has meant self-report measures have evolved as the main method of data collection (Sallis & Saelens, 2000; Ransdell & McMillen, 1997; Caspersen, 1989; Powell et al., 1987; Washburn & Montoye, 1986; Wilson et al., 1986). Whilst the validity of self-report data is not as high as most physiological measures, it has the advantage of being able to collect large amounts of data from a large number of people in the least obtrusive way. For this reason, self-report data collection is the instrument of choice when conducting large scale evaluations in free-living populations (Paffenbarger, Blair et al., 1993). Self-report data collection requires participants to recall specific items over a specified time frame and may be collected from personal interviews, diaries or logs, either over by telephone interview or through postal self administered surveys.
Daily diaries or logs are a continuous record of participation in physical activity and can provide accurate and detailed information on the participant’s physical activity routine. However, this method requires intensive effort from the participant to maintain an accurate diary, hence little more than 1-week of data collection is possible, which limits the representativeness of the data collected (Caspersen, 1989). The volume of information collected also increases data processing costs. Researchers have reported that the simple action of recording your daily activity can encourage increased physical activity (Miners, 1995, Caspersen, 1989; LaPorte et al., 1985) as people become compelled to react, or feel obliged to change their behaviour to suit the socially desirable behaviour. Therefore, because of cost and the issue of representativeness and possible intervention effect, the diary method is the least preferred option of self-report data collection for evaluating a large-scale intervention (Haskell et al., 1992).

Self-report physical activity surveys are most often used to assess the physical activity levels of large samples as they are practical and have low study and respondent costs relative to the volume and detail of information they can provide (Caspersen, 1989; Washburn & Montoye, 1986; LaPorte et al., 1985). Since physical activity must be performed to be of benefit, most physical activity surveys ask for an accurate recall of past participation (Caspersen, 1989; LaPorte et al., 1985). Details on the frequency, intensity and duration of physical activity may also be requested. Respondents are often required to report the activity they have performed in both the recent (past 1- or 2-weeks) and distant past (past 6-months). However, one issue to be remembered when interpreting physical activity recall data is the assumption that the object of measurement (physical activity) is relatively stable over time. Regardless of this however, recall of recent physical activity participation (between 7- to 14-days) has been shown to have acceptable reliability (Sallis et al., 1985; Blair, Haskell et al., 1985), particularly in middle aged adults (Sallis & Saelens, 2000).
Other strategies may also be used to determine estimates of physical activity participation, including defining a 'usual' or 'typical' week or by using global* estimates. Global estimates of physical activity have the advantage of being relatively short but are limited by the amount of information they provide. Unlike recall surveys which define a period of recall (typically 1-or 2-weeks, 1-month or 1-year; Blair et al., 1991), which are able to provide more accurate past physical activity participation levels than global estimate questions (Ransdell & McMillen, 1997).

Surveys may be self- or interviewer-administered; the latter costs more in terms of interviewer training, administration and quality control, but may be conducted over the telephone or face-to-face. Face-to-face interviews tend to be more intensive and more expensive to manage than self-administered surveys. Interviewer-administered face-to-face surveys may also be more susceptible to some of the usual biases (intrusion bias, social desirability bias, and general over reporting bias; Bauman, 1987; Blair, 1984) associated with surveys compared to a telephone-administered interview. These biases may also introduce a pseudo intervention effect or entice reporting bias as the respondent tries to impress the interviewer.

Comprehensiveness of the questions asked, and concerns for confidentiality may too affect the accuracy of responses given by participants. However, many of the abovementioned problems can be minimised by using questions that have been previously shown to be valid and reliable.

Interviewer-administered physical activity questionnaires have been shown to have acceptable reliability and validity (Booth et al., 1996a; 1996b; Baranowski, 1988; Godin et al., 1986; Sallis, Haskell et al., 1985; Blair, Haskell et al., 1985). Furthermore, the data collected may be used to estimate energy expenditure based on time reported being physically active and the estimated energy expenditure categories assigned to each physical activity (Sallis, Haskell et al., 1985; Blair, Haskell et al., 1985). However, if converting the data to energy expenditure

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* Global questionnaires ask questions like such as 'How do you rate the physical activity you do now getting compared to others your same age and gender?' (Blair, Haskell et al., 1985, p. 796), thus only provide an estimate of overall physical activity not an actual measure of physical activity preformed.
estimates it is essential to use published conversion tables (Montoye et al., 1996) to ensure the predicted variables accurately portray the energy costs associated with particular grades of physical activity (in particular moderate and vigorous activity levels see Section 5.8.4)

A study using 375 male subjects, assessed physical fitness using a modified Balke & Ware treadmill protocol compared to a self-report physical activity questionnaire administered through the mail. Combined energy expenditure estimates were calculated from the questionnaire data to give an overall index for physical activity participation. The ability of the physical activity index to predict the physical fitness score was assessed using multiple regression analysis. Results lead researchers to believe that physical activity status could be accurately predicted in large populations using simple questions in a mail surveys (Kohl et al., 1988).

Recall surveys have also been shown to be an effective estimate of habitual physical activity, capable of determining significant changes in physical activity following intervention programs (Blair, Haskell et al., 1985). Furthermore, the self-report physical activity change data were corroborated by physiological assessment of changes in physical fitness (assessed using VO2 max; Blair, Haskell et al., 1985).

A change in the physical activity promotion message from vigorous to moderate has made measurement of physical activity participation difficult. Vigorous activity is usually easily remembered, as it required the participant to carefully plan when and where they were going to do the activity. Moderate activity can be performed anywhere anytime and can involve multiple small sessions in a day. Therefore, the development of the perfect survey questions to monitor all forms of physical activity is ongoing (Haskell et al., 1992). However, it is advisable to use questions comparable to previous research, for consistency and so that more accurate comparisons can be made. Nonetheless, surveys have been shown to be valid, reliable and sensitive as well as the least intrusive method of data collection compared to other physiological measures of physical activity (Booth et al., 1996a; Booth et al., 1996b), suitable for use in large samples.
4.4 Summary

Based on the literature reviewed it is understood that physiological and mechanical means of measuring physical fitness tend to be more objective. However, the aim of this thesis is to use a measure that evaluates physical activity as a behaviour, not physical fitness as physiological response of being physically active. Both physiological and mechanical means of evaluating physical fitness are themselves not devoid of limitations. For example, heart rate is affected by emotional responses and caffeine. Accelerometers have not been validated across all age groups (Patterson, 2000), and are not a feasible option for large population-based studies. Furthermore, additional work needs to be conducted to improve the precision and assurance that data collected from mechanical monitors is relevant to the definition of physical activity being promoted. This however, it is beyond the scope of this thesis. Self-report measures were therefore, the preferred option of evaluating physical activity in this thesis.

The main advantage of collecting data from self-report enables data to be collected from a large number of people at relatively lower cost than collecting data using other physiological or mechanical means. Furthermore, collecting data via self-report does not alter the behaviour under study, and enables all dimensions of the behaviour to be examined. Sallis & Saelens (2000) encouraged researchers to choose to use an existing self-report measure so that accurate comparisons between data and research findings could be achieved. Therefore, it was concluded that the best method of evaluating the community intervention trials conducted in this thesis was to use the commonly used telephone interviewer-assisted, self-report Australian physical activity surveys, which have been validated by Booth et al. (1996a & 1996b). This was deemed the preferable option based on the costs involved, and the minimal intervention impact the brief self-report survey themselves may have on present or future physical activity participation. The development and implementation of the physical activity surveys used in this thesis are discussed in Chapter 5 for Study 1 and Chapter 8 for Study 2.
5. Illawarra Randomised Controlled Trial: Methods

5.1 Illawarra randomised controlled trial study design

Prior to conducting the study human research ethics approval was obtained from the University of Wollongong Human Research Ethics Committee. Data management and evaluation were conducted according to the NH&MRC Statement on Human Experimentation (NH&MRC, 1994).

The design of the Illawarra study was a randomised controlled trial (RCT). After baseline data were collected, consenting participants were stratified by stage (see Section 5.8.5) and randomly allocated within stages, using random data selection in SPSS® v6.0 for Windows (SPSS, 1993) to either the:

1. intervention group included those participants allocated to receiving the self-help print intervention (see Section 5.5), or the
2. control group included those participants who were allocated receiving no intervention.

The two groups were followed-up 2- and 6-months after baseline data were collected. A schematic representation of the study design is shown in Figure 5.1.

![Figure 5.1: Schematic diagram of the Illawarra RCT study design](image)

Where:
- $X_1$: Self-help print intervention mailed to intervention group 1 week after baseline
- $P_1$: Process evaluation of the self-help print intervention 4 to 6 weeks after baseline
- $O_1$: Telephone follow-up survey with all participants 2-months after baseline
- $O_2$: Telephone follow-up survey with all participants groups 6-months after baseline
5.2 Sample selection for the Illawarra RCT

The Illawarra RCT sample was selected from the original Illawarra Physical Activity Project (IPAP)* population benchmark survey. The IPAP benchmark survey was conducted in November 1995 (IPAP, 1996), during which time a simple random sample of 1,200 adults aged between 40- and 60-years were surveyed†. Potential respondents households were randomly selected from the 1995 White Pages™ Directory on CD‡. The eligible respondent within that household was identified as the person who was aged between 40- and 60-years of age, whose birthday occurred next. These sample selection methods were used to maximise the opportunity to collect information from a representative sample of Illawarra residents. The random sampling and telephone survey were conducted by the Hunter Valley Research Foundation§ on behalf of the IPAP management.

* The IPAP was a National Heart Foundation (NSW Division) project funded by the Commonwealth Department of Health and Family Services, with support from the NSW Health Department. The author of this thesis was a research assistant with the IPAP. The IPAP was initiated in 1995 as a community wide, health promotion initiative to increase the awareness and the prevalence of moderate-intensity physical activity, in Illawarra adults aged between 40- and 60-years of age. IPAP was managed by an inter-sectoral Steering Committee, incorporating local government, health service personnel, sport and recreation, general practice and local industry (Bauman et al., 1996).

† A household response rate of 71% of eligible respondents identified during the interview period (IPAP Report, 1999)

‡ This particular sampling procedure and data collection technique excludes people who do not have a telephone connected or are not listed in the White Pages™ Directory. This potentially biases socially disadvantaged groups who cannot afford to have a telephone and socially advantaged groups who prefer to have an unlisted telephone number. However, Australia has reasonably complete telephone coverage, with over 93% of all household connected in 1985 (ABS, 1985). One sampling and data collection method, which may overcome the telephone bias, is face-to-face interviewing within randomly selected households. However, this method can be expensive and time consuming and was not a valid option for the present research study. Another issue of possible sampling bias was introduced by not catering for non-English speaking people, who were ultimately excluded from the data set. Demographic data pertaining to the Illawarra RCT sample are presented in Section 6.3.

§ The Hunter Valley Research Foundation is a private company who specialise in conducting telephone surveys.
From the IPAP sample, complete data were available from 1,197 respondents, from which 948 (79%)* subjects consented to being re-contacted. Of the 948 consenting respondents, only 927 (77%)† gave their full name, home address and contact telephone number. This sub-sample formed the basis of the sample selected for the Illawarra RCT (see Figure 5.2). Before being re-contacted by telephone, the 927 respondents were sent a letter (see Appendix D), at least 1-week before attempting telephone contact to notify them of the upcoming survey‡. Twenty five respondents withdrew their consent‡ and were removed from the contact list leaving 902 (75%) be re-contacted.

A total of 760 participants were successfully followed up in September 1997, 63.5% of the original IPAP Benchmark sample and 84.3% of the consenting sub-sample. This survey served two purposes: i. as a natural history cohort (Illawarra cohort study)§, and ii. as the baseline for the Illawarra RCT. Results of the Illawarra cohort are reported in Appendix E**. From the 760 respondents re-contacted, 738 (97%) consented to being followed-up again. This served as the consenting process to become involved in the Illawarra RCT.

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* Response rate was expressed as a percentage of the original IPAP benchmark data set (n = 1,197).
† The preliminary notice of intending survey was a requirement of the University of Wollongong Human Research Ethics Committee, to allow the respondents the opportunity to withdraw their consent to be included in the follow-up study, as it had been approximately 2-years since they had given their consent. Those who received the letter and did not want to participate in the survey were asked to either telephone, write or fax the principle investigator so their name could be withdrawn from the contact list.
‡ Eleven letters were returned to the investigator unopened, eight respondents withdrew consent, two had moved out of the area and four respondents had passed away within the past 2-years.
§ A cohort of this nature is important as it helps to establish what happens within a community sample when no specific intervention has been targeted at the individual. The results of this separate research question are presented in Appendix E.
** Based on the results presented in Appendix E, it appeared there was little to no change in self-reported physical activity or Stage of Change in those who were followed up between 1995 and 1997 as part of the Illawarra Cohort. This is an important finding in that it suggests that the natural tendency is for physical activity levels to remain relatively unchanged if there is no specific intervention implemented targeting individuals. Hence the intervention planned as part of this thesis seems particularly important and the group selected to evaluate this intervention suitable for this purpose.
The consenting 738 participants data were stage analysed (see Section 5.8.5) and matched to their 1995 stage. Those participants who were in the maintenance stage in 1995 and remained so in 1997 (n = 259) were removed from the Illawarra RCT sample as they were considered to be ineligible for a physical activity intervention since they had maintained an adequately active lifestyle at both data collection points. This left an Illawarra RCT sample size of 479 participants, who were classified by their stage group and randomly allocated into one of two groups (either an intervention or control group) using random data selection in SPSS® v6.0 for Windows computer package (SPSS, 1993). The intervention group was allocated 242 participants and the control group was allocated 237 participants.

Figure 5.2: Flow diagram of the sample selection process for the Illawarra RCT
After the participants were randomised into their groups, routine data verification resulted in an error being identified in the body mass conversions within the 1995 data. This error resulted in seven participants being inappropriately stage classified in the 1995 and 1997 data. Therefore, five participants from the intervention group and two participants from the control group were removed from the Illawarra RCT sample (see Table 5.1). The body mass conversion miscalculation was not identified until after the intervention phase of the Illawarra RCT had begun. Therefore, 10 additional intervention group participants were removed from the RCT as they had been sent inappropriate intervention materials. This left a total sample size of 462 participants, 227 intervention group participants and 235 control group participants.

Table 5.1: Randomisation of groups and loss of participants

<table>
<thead>
<tr>
<th>Stage of change</th>
<th>Exclusions 1995</th>
<th>Exclusions 1997</th>
<th>Final stage allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>29</td>
<td>29</td>
<td>-3</td>
</tr>
<tr>
<td>Contemplation</td>
<td>53</td>
<td>53</td>
<td>-13</td>
</tr>
<tr>
<td>Preparation</td>
<td>62</td>
<td>62</td>
<td>+4</td>
</tr>
<tr>
<td>Action</td>
<td>34</td>
<td>-1</td>
<td>33</td>
</tr>
<tr>
<td>Maintenance</td>
<td>55</td>
<td>-4</td>
<td>51</td>
</tr>
<tr>
<td>Relapse</td>
<td>9</td>
<td>9</td>
<td>-1</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>242</td>
<td>-5</td>
<td>237</td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>28</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Contemplation</td>
<td>52</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>62</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>31</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>55</td>
<td>-2</td>
<td>53</td>
</tr>
<tr>
<td>Relapse</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>237</td>
<td>-2</td>
<td>235</td>
</tr>
</tbody>
</table>

* participants lost due to 1995 data error
** participants lost due to 1997 data error

Sample size calculations were based on the method for selecting sample size described by Altman (1991) and using an estimated 10% difference between groups (as was reported by Marcus, Emmons et al. (1998) following a tailored stage-based
intervention trial). Based on the fact that approximately 38% of the sample were adequately active (considering that some of the participants in M were removed from the study samples), the standardised difference equals 0.20. Therefore, for the trial to have at least 80% power (as recommended by Altman, 1991), using \( p = 0.05 \), 600 participants were required (300) in each group. With 452 participants in randomised between the two study groups (see Table 5.1) the power to detect an intervention effect was around 65%, slightly less than optimal.

### 5.3 Illawarra RCT survey instrument

The questions used to collect data in the Illawarra RCT were pre-determined, by the IPAP Management Committee who commissioned the IPAP Benchmark survey data collection in 1995 (see Sections 5.2). For the purposes of this thesis is was important to retain the same questions that were used during the first contact with the study participants, so that accurate comparisons between data collection points could be made. Also for consistency the same survey instrument was retained for the two follow-up surveys.

The physical activity questions used in the IPAP Benchmark survey were derived from validated instruments, that have been used extensively surveys pertaining to the physical activity levels of adult Australians (NHF, 1989; Booth et al., 1995; Bauman, Bellew et al., 1996).

In addition to the IPAP Benchmark physical activity questions, items were required to evaluate the particulars of the participants (including demographics) and the use of the self-help intervention itself. Where possible these questions were derived from previously tested and validated questions (see Section 5.4). However, where no source of a valid question was located, combined expert judgement* was used to formulate appropriate questions (see Section 5.3.3 and Section 5.3.4). Using expert knowledge to define questions can provide valuable assistance in producing a valid and reliable instrument based on the most recent developments in the area (Bauman et al., 1998a).

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* Experts used to develop appropriate questions were the same people who examined the design and development self-help print intervention (see Section 3.2).
It has been reported that when confidentiality or anonymity is assured, responses to questions are more likely to be valid (Steel et al., 1996). Participants in the present study were, therefore, assured of confidentiality before any survey questions were asked.

The sequence in which the questions were asked remained the same throughout all the follow-up surveys reported in this thesis because question order may also affect the responses given. However, in multiple component questions relating to a similar topic, the order of the items was randomly rotated to reduce the influence of an ordering effect. A complete copy of the Illawarra RCT survey is included in Appendix F.

### 5.3.1 Demographic measures

The demographic questions used in the IPAP Benchmark survey were derived from the standard questions used in the 1994 State-wide Health Promotion Survey*. Data collected from the NSW 1994 Health Promotion Survey were shown to be representative of the Australian Bureau of Statistics census data (Bauman, Bellew et al., 1996).

The demographic variables collected in the IPAP Benchmark survey were; age, gender, postcode of residence, highest educational attainment, employment status, country of birth, and language spoken at home. These questions were not repeated in the Illawarra RCT survey, as age could be predicted, postcode of residence was confirmed by sending the preliminary notice of intending survey (see Section 5.3) and the other factors were not expected to have significantly changed and due to the random nature of the study changes would be evenly distributed between the groups.

Self-reported height and weight were also collected in the IPAP Benchmark survey. Self-reported height was not collected again in the Illawarra RCT survey as it was not expected to have changed. However, self-reported weight was collected at baseline and 6-months. NSW Health (Bauman, Bellew et al., 1996) reported that

* The questions used in the 1994 Health Promotion Survey were originally adapted from standard questions used by the Australian Bureau of Statistics, National Health Survey (1990).
self-reported height and weight were valid when compared with actual measures of height and weight. The mean difference in height and weight between the two measures was $1.0 \pm 3.5$ cm and $2.7 \pm 4.6$ kg, respectively. These measures also recorded acceptable reliability with 77% and 68% of the sample reporting the same height and weight, when asked on two separate occasions (Bauman, Bellew et al., 1996).

5.3.2 Physical activity measures

The questions related to the assessment of physical activity used in the IPAP Benchmark survey were derived from the original National Heart Foundation Risk Factor Prevalence Surveys (NHF, 1989)*, and were adapted from the 1994 NSW Health Promotion Survey (Bauman, Bellew et al., 1996; NSW Health, 1996). The 2-week recall questions have been shown to have acceptable reliability and validity (Booth et al., 1996a; 1996b; Booth et al., 1995) and were, therefore, considered appropriate to use in the present thesis. Separate questions asked about recent (i.e., past 2-weeks) walking for recreation and transport, moderate and vigorous physical activity. For each physical activity reported, the total time, frequency, and perceived intensity were recorded. Ainsworth et al. (1993) reported that considering these factors could minimize the error in recalling moderate and vigorous intensity activity. Past (i.e., last 6-months) or usual physical activity levels and intention to be physically active in the near future were also asked.

5.3.3 Measuring the Stages and Processes of Change

Eight different staging algorithms from three unrelated studies were retrospectively compared and revealed that algorithms using longer, clearer definitions of exercise resulted in more subjects being classified into the early stages (PC and C; Reed et al, 1997). The authors also concluded that staging algorithms need to be very precise, stating all parameters required to meet the criterion of physical activity

* National Heart Foundation Risk Factor Prevalence Surveys were national surveys examining the risk factors for Cardiovascular disease, conducted in 1980, 1983, and 1989. Each survey provided useful data for planning and monitoring community prevention programs for Cardiovascular disease.
(Reed et al., 1997) as well as intention to change. Furthermore, Godin et al. (1995) recommended it was appropriate to operationalise the Stages of Change in terms of past behaviour and future intention. A stage algorithm developed by Booth*, which complies with these recommendations was used in this thesis. The Booth algorithm uses each individual's: i. current physical activity participation (past 1 or 2 weeks), ii. habitual physical activity participation (past 6-months), and iii. intention to change physical activity participation in the near or distant future, to determine Stage of Change† (see Appendix I, for the three dimensional matrix). This method was preferred to other methods of staging developed by Marcus, Rossi et al. (1992) as respondents' actual self-reported activity levels are used as opposed to using the respondents perception of how active they are. Secondly, the respondents' intention to be more active is also considered independently, which offers further stability to the measure, thereby, making it consistent with other forms of stage measurement.

As an underlying construct of the stage of change model (see Appendix A), the Processes of Change were evaluating using a 10-item question (see Q.22 in baseline Survey, Appendix F). This 10-item question was modified from the 40-item question previously cross validated and used by Marcus, Rossi et al. (1992). The 10-items were selected using expert judgement, to have one item per Process of Change, using the item most appropriate for Australian adults. Another reason the question was shortened to 10-items was the cost involved, first in administering the question and secondly the burden of time imposed on the respondents, by having the complete 40-item question included in the survey.

5.3.4 Intervention evaluation measures

It was necessary to include questions to determine if the intervention had been received and whether it had been used as intended. The questions used were

* Unpublished, M.L. Booth (Department of Public Health and Community Medicine, University of Sydney).

† Both the current and habitual physical activity prevalence rates are used to categorise subjects as adequately or inadequately active, using the method described in Section 5.8.4. The third factor influencing the respondents’ stage was intention to be active in the near future. The stage algorithm enables respondents to be classified into one of the five pre-identified Stages of Change and a possible sixth stage ‘relapse’.
Typical health promotion trials often ask these questions to distinguish ‘Intention to Treat’ analysis from ‘Treatment Received’ and ‘Treatment Received and Read’ analyses (these data analysis strategies are discussed in more detail in Section 5.9). The intervention evaluation questions included unprompted and prompted recall of the self-help printed materials, whether the materials were read, and useful and what had been done with them since they were received.

5.3.5 Background media influences during the Illawarra RCT

As a measure of ‘other’ factors, which may have influenced the study participants’ physical activity, media awareness was monitored. A global media question was asked (baseline survey Q26, see Appendix F) to determine whether any mass media or background information may have influenced participants throughout the study period. An open-ended message recall question followed to determine the types of messages being recalled by the participants at each follow-up. The types of messages recalled in the open ended question were content analysed and close coded into recall of specific exercise campaign messages (consistent with the background media advertising relevant to the IPAP), general physical activity messages and other health messages.

5.4 Survey methods used in the Illawarra RCT

5.4.1 Baseline survey methods

Attempts to contact the 902 consenting respondents (see Section 5.2) were made between 3rd and 12th of September, 1997. The Hunter Valley Research Foundation used a computer assisted telephone interviewing (CATI) system throughout the interviewing process. Attempts at contacting each respondent were made between 11 am and 8.30 pm, Monday to Friday. Despite the extended hours, most

* Data analysis codes are reported in Appendix I.
† The CATI system allows the interviewer to directly enter the data into a computer program which directs the interview, identifying appropriate skips throughout the questionnaire.
interviewing was completed between 3:00 pm and 8:30 pm. The most productive interviewing times were Monday, Tuesday and Wednesday evenings.

Up to six call backs were planned to contact the named respondent. However, there were many instances were more than six call attempts were conducted. In these instances, the respondent had been confirmed as living within the household, but had been unavailable at the times when the call attempts were made, so up to 10 call backs were made. Where the respondent had moved since the 1995 survey, interviewers attempted to identify a new contact telephone number for the respondent from the new resident, the Electronic Telstra White pages or the manager of the rental property (if appropriate).

At the end of the survey respondents were asked if they were willing to be recontacted to participate in a similar survey and/or receive some written materials in the mail. This served as the consenting process to become involved in the Illawarra RCT.

5.4.2 The 2-month follow-up survey methods

The Hunter Valley Research Foundation were again commissioned to conduct the survey between the 2nd and 19th of November, 1997. The same survey instrument and contact methods as were used during the baseline data collection were used again in the 2-month follow-up. However, process questions regarding the intervention were asked, and the question used to determine the respondents weight was removed as it was not expected to have significantly altered within the 2-months since baseline data was collected. A minimum of 6 call backs were attempted to contact the named participant, with up to 12 call backs made where a participant was confirmed to be at the residence but unavailable at the time the call was made. As with the baseline survey participants were asked if they were willing to participate in a similar survey in the future. This served as the consenting process to be re-contacted at 6-months.

5.4.3 The 6-month follow-up survey methods

The 6-month follow-up was conducted at the University of Wollongong, Biomedical Science Department using four trained interviewers due to a lack of
financial resources to commission the Hunter Valley Research Foundation again. However, particular attention was paid such that similar methods were used to conduct the interviews. The interviewers were blinded to the group status of the participants they were interviewing. Interviewing took place between the 1st and 28th of March, 1998 between the hours of 4:30 pm and 8:30 pm on most weeknights. Some telephone interviews were conducted at alternate times of the day and on weekends at the respondents request. A minimum of 10 but up to 12 call backs were conducted to each household until a response was obtained from the named respondent (either as a completed survey or refusal). The same survey instrument (see Appendix F) as was used in the previous two surveys was again used, with the addition of the question regarding the participant’s weight.

5.5 Implementation of the self-help print intervention

After the formative evaluation of the four self-help print intervention booklets (Section 3.3), 1,000 full colour copies of each booklet were produced, 500 each to be used in the present thesis RCTs and 500 in the collaborative Active Practice Project. As discussed previously in Section 3.2, the self-help print intervention was specifically designed as DL size booklets to enable them to be posted in a standard envelope. Delivering the intervention through the mail was determined to be the most cost effective dissemination method, enabling a large number of people to be offered the intervention (see Section 2.6.2.6).

The intervention developed for the present RCTs included a set of four booklets targeting the five Stages of Change (see Section 2.7.2). To enable study participants to receive the self-help booklet designed for their particular stage of readiness for physical activity, the participants’ baseline data were stage analysed (see Section 5.8.5) to categorise them into one of the five Stages of Change. The intervention (shown at X1 in Figure 5.1), then involved each intervention group participant being mailed the
‘Active Living’ booklet aimed at their particular Stage of Change, plus any subsequent booklets in the series approximately 1-week after baseline data was analysed*.

The self-help booklet(s) were mailed with a personally addressed covering letter, which used colour-coded lettering, corresponding to the different booklets (see Appendix G). This was to help participants identify and use the booklet designed for their current Stage of Change. The letter explained how and when to use the other booklets. For example, a subject in PC would receive all four booklets but be directed to read ‘Have you heard the good news?’ first, whereas a subject in P would only be sent two booklets ‘Take the step!’ and ‘Keeping in step!’, but were directed to read ‘Take the step!’ first. It is important to note, however, that in the present intervention the booklet(s) aimed at the stages preceding the participants’ own Stage of Change were not sent to the participant as the information provided in such booklet(s) would have been redundant for that particular participant. As discussed previously, each booklet had telephone numbers for regional health promotion centres, to allow participants’ to telephone for additional information or advice if they needed it.

5.5.1 Process Evaluation of the Self-help Print intervention

Each intervention group participant was contacted by telephone approximately 4 to 6 weeks after the self-help print intervention had been sent out. Four to 6 weeks was considered sufficient time for the participants to have received and read the intervention materials. During this telephone call, participants were asked a series of questions (see Appendix H) relating to whether they received and read the materials, what they did with them and whether they had attempted to become more physically active since receiving them or what had prevented them from being more physically active. The aim of this telephone call was to gain process information on the booklets. Participants were also offered some standardised advice on how to overcome a barrier that they may have been experiencing.

* Owen et al. (1987) reported that this was the most effective way of distributing materials rather than sending subsequent materials in separate mailings (see Section 2.6.2.6). The authors believed that this was a more effective and efficient method of dissemination as it allowed the participants to read and use the self-help print materials when and how they liked, rather than having to wait until the next part of the intervention arrived to move onto the next stage (Owen et al., 1987).
Process evaluation interviews were conducted from the University of Wollongong using three trained interviewers on weeknights between 4:30 pm and 8:30 pm. Only intervention group participants were contacted. Approximately 352 phone calls were made. Of the 227 participants sent materials 215 were contacted (contact rate = 95%). The 12 participants who were not contacted after 12 call backs were retained in the intervention group sample for the 2-months follow-up.

After all process calls had been made five intervention group participants withdrew their consent to being re-contacted for the remainder of the study. This left 222 intervention group participants to be re-contacted during the 2-month follow-up.

5.6 Data management and quality control

Baseline and 2-month data were entered into a database by the Hunter Valley Research Foundation using the CATI system (see Section 5.4.1). Data sets were then transferred to D-base 4.0 format, and delivered to the author of this thesis. After the data were received it was then transferred into SPSS® v6.0 for Windows (SPSS, 1993) format where they were thoroughly cleaned and cross-checked. The original data files were kept as a back up to the working file.

At baseline each participant was assigned an identification number, which was subsequently used to match their baseline data with the 2 and 6-month follow-up data to enable paired statistics to be conducted (see Section 5.10). Participants’ names and addresses were not kept with the research data to ensure anonymity and confidentiality of the data. When the follow-up data sets were merged, each participant’s identification number was cross-checked with their date of birth and gender. Any discrepancies in date of birth or gender were then cross-checked with the participant’s details in the original data set.
5.6.1 Follow-up response rates

A methodological concern when conducting longitudinal research involves the loss of participants to follow-up. Calculating a response rate, is an important procedure because a low response rate can expose systematic differences between the sample obtained and the sample that would be considered to be representative of the population you are sampling from. That is those people who are willing to respond to the survey may be different in some way to those who refused. Lee & Owen (1986) reported that people who replied to the initial attempt at a survey were not representative of the entire sample of participants they ultimately gained after repeated attempts at gaining responses. They also reported that those people who were easiest to contact during follow-up surveys reported a significantly greater amount of current exercise than those for whom it took several attempts to obtain a response (Lee & Owen, 1986). Therefore, although it can be time consuming and expensive to try and contact all respondents it is important to try to contact as many as possible to get the most accurate, meaningful cross-sectional data.

An acceptable response rate for community-wide random samples is above 65% (Hawe et al., 1994), when calculated by the number of responses generated divided by the number of possible responses. However, aiming above this rate is advisable. The response rates for each of the three Illawarra RCT surveys are reported in Section 6.2. In addition to ensuring a high response rate it is also particularly important to monitor changes in group demographics when participants are lost to follow-up. The advantage of conducting follow-up surveys is that if demographic data was collected at baseline, the researcher is able to compare the baseline data between those who either refused or were lost to follow-up with those who completed it. This allows the researcher to determine whether the missing data would significantly affect the results reported which are ultimately based on those who were retained in the sample. If a difference is detected it may introduce a

* Response rates may be either be reported as a household response rate, where the number of interviews completed is divided by the total number of households where a potential respondent is identified, or a respondent response rate, where the number of respondents interviewed is divided by the total number of respondents previously contacted. Respondent response rate is reported here since the respondents had already been identified in previous surveys.
biasing effect which would need to be considered in interpreting the results. Comparisons between the study group participants followed-up during the Illawarra RCT were conducted after the 2- and 6-month follow-ups were attempted, in terms of group demographics and baseline physical activity levels (see Section 6.3).

5.7 Characteristics of the Illawarra RCT study sample

The accuracy of survey estimates depends on how closely the survey sample matches the survey population from which it was selected. Estimate error can be minimised or controlled by monitoring the characteristics of the sample and ensuring as many of the original sample are re-contacted during follow-up (Australian Bureau of Statistics, 1991).

5.7.1 Representativeness of the Illawarra RCT study sample

To ensure the study sample selected and contacted for the Illawarra RCT represented the population from which it was drawn, comparisons were made. The Illawarra RCT study samples’ demographic variables were compared to the most recently available census data pertaining to the Illawarra region (see Section 6.2).

5.7.2 Comparability of the Illawarra RCT study groups

To ensure comparability between the two randomly selected study groups, comparability checks were conducted between the intervention and control groups at baseline, 2- and 6-months. Variables used to compare the groups included the baseline demographics and physical activity prevalence rates (see Section 6.3).

5.7.3 Exclusion of participants from the Illawarra RCT based on reported illness, injury or disability

A global illness and disability question was inserted into the survey (see Appendix F, baseline Survey Q25) to determine if any the respondents had suffered from a condition, which may have limited their participation in physical activity. The nature of the condition was then determined through an open-ended question to gain unprompted response as to the type and severity of the condition reported by the respondent. After content analysis the types of illnesses and disabilities reported in the open ended question were close coded, by type of problem (musculoskeletal or
Illawarra RCT: Methods

disease) and by severity reported (limiting or not limiting). Exploratory data analysis was conducted to determine what effect excluding these participants’ data from the analysis would have on the overall outcomes (see Section 6.15 and Appendix N).

This form of exclusion analysis was also conducted in the NSW Active Australia Campaign Cohort (Bauman et al., 1998b). This report concluded that limiting the sample to only include those not suffering a major disability of illness (excluding n = 320 respondents) did not significantly alter the findings of the cohort analysis, both in terms of trends across the pre-post campaign and significance levels of observed findings (Bauman et al., 1998b).

5.8 Data preparation

Data from the follow-up surveys were used to determine whether the self-help print intervention had an effect on participants’ self reported physical activity participation. Data analyses were conducted in SPSS® v6.0 for Windows (SPSS, 1993) and Epi-info 6.04 (Epi-info, 1997), using several different data preparation strategies described in the following sections.

5.8.1 Socio-demographic data

Descriptive frequencies for the demographic variables of age, gender, marital status, employment status, occupation, children living at home, education level, country of birth, and language usually spoken at home were examined prior to further data analysis. These data were compared, using independent t-tests, or the Chi Squared statistic for categorical data between the groups to determine if the groups were comparable with respect to these characteristics.

* Illness or disabilities were coded as not limiting, if it was considered that the respondent should still be able to walk at a moderate intensity, such as the type of physical activity promoted by the self-help print intervention. In fact participation in moderate intensity activity may be beneficial to participants reporting hypertension, asthma, diabetes and may even help prevent further decline in health status from these diseases.
5.8.2 Physical activity data

Responses from physical activity questions may be scored based on the percentages of persons answering a question a certain way, categorised by estimated energy expenditure or a direct comparison of the amount of time spent being physically active (Leon et al., 1987; Paffenbarger et al., 1978).

Physical activity prevalence across the three activity categories (walking, moderate, and vigorous physical activity) were analysed by determining individual changes in physical activity participation using similar methods as those reported by Smith et al. (2000). To reduce the effects of over reporting, total time spent in each activity category was truncated to 14-hours per week. Thereafter, the total summed amount of physical activity undertaken by an individual was truncated to 28-hours per week (or 4-hours a day). Truncation to 28-hours per week was determined to be a reasonable estimate of the maximum amount of time average individuals could spend being physically active in any given week. This was done to normalise the variance in the distribution, but truncation had little influence on the sample means. This type of data preparation has been used previously (Bauman, Bellew et al., 1996). Truncation did not affect the categorical measures of physical activity but did normalise the distribution of continuous measures (such as minutes spent being physically active), so that parametric analyses could be conducted. Therefore, descriptive frequencies, means and standard deviations were calculated for the continuous walking, moderate and vigorous intensity physical activity data followed by analysis of the data using a repeated measures ANOVA.

Open-ended questions regarding the type of physical activity reported in the moderate and vigorous physical activity questions were close coded. Closed coding was performed after visual inspection of the data which revealed common categories of physical activities were reported.

Note that several different definitions of adequate physical activity were used in the data preparation and subsequent analysis, and although not completely independent of each other they reflect different possible interpretations of adequate physical activity outcomes.
5.8.3 **Criterion of sufficient physical activity per week**

More recent interpretations of the data suggest that 150-minutes of physical activity per week is a sufficient level to be participating in (Bauman & Egger, 2000; Lesjak & Bauman, 1998). Furthermore, 150-minutes of physical activity per week conducted over at least five sessions per week has been suggested as a minimum requirement for physical activity from which numerous health benefits can accumulate (USDHHS, 1996).

5.8.4 **Energy expenditure analysis**

Energy expenditure is a useful estimate of physical activity exertion by an individual. It is calculated in metabolic equivalents (METs), where one MET is defined as the body's metabolic rate when at rest (sleeping). METs are estimated in terms of oxygen consumption per unit of body mass, which is approximately equal to an oxygen uptake of 3.5 mls O$_2$.kg.body mass$^{-1}$.min$^{-1}$ (Ainsworth et al., 1993). Energy expenditure can also be estimated in kilocalories (kcal), where one MET equals approximately 1-kcal.kg$^{-1}$.hr$^{-1}$ for a 60 kg person (Blair, Haskell et al., 1985; Sallis et al., 1985). Hence, energy expenditure during physical activity may be calculated as a multiple of the resting metabolic rate. MET estimates increase with the intensity of the reported activity (Blair, Haskell et al., 1985; Sallis et al., 1985). Blair, Haskell et al. (1985) assigned energy expenditure estimates of 4 METs for moderate physical activity, 6 METs for hard activity, and 10-METs for very hard activity. These activity categories were shown to be compatible with other questionnaire estimates of physical activity (Blair, Haskell et al., 1985).

To calculate each person's energy expenditure for walking, moderate and vigorous physical activity in the present study, an algorithm developed for the Pilot Survey of the Fitness of Australians (Gore & Edwards, 1992)* was used. This algorithm has

---

* This survey was conducted to gain an accurate representation of the fitness of Australians using a sample of 2,289 subjects, and was supplemented with physiological tests on over half of the sample (1,246). The study showed that self-reported physical activity habits had consistent associations with the objective physical fitness tests. Therefore, self-report data were found to be valid and reliable estimates of physical fitness, suitable to be used to monitor the fitness of Australians.
been used repeatedly by Booth et al. (1996a; 1996b) and the 1994 and 1996 NSW Health Promotion Surveys (Bauman, Bellew et al., 1996; Lesjak & Bauman, 1998). The method uses the person’s self-reported body mass (kg)*, multiplied by the total amount of time reported doing each physical activity category (hours per week), multiplied by the estimated MET value. The estimated MET values for vigorous and moderate intensity activity and walking were 9.0-, 3.5-, and 3.5-METs respectively. This is in agreement with Sallis, Haskell et al. (1985) who estimated vigorous intensity activity expended at least 6-METS, and moderate intensity activity expended between 3- and 5-METS.

Data from the present studies gave an estimated energy expenditure over 2-weeks, which was divided by two to gain a 1-week energy expenditure estimate. A total physical activity energy expenditure estimate was calculated by summing the energy expenditure estimate from each separate activity. Total energy expenditure was then categorised into four distinct categories as were used in the 1994 NSW Health Promotion Survey (Bauman, Bellew et al., 1996). The four categories were:

1. High; expended >1600-kcal from any physical activity and participated in at least 1-hour of vigorous intensity physical activity per week,
2. Moderate; expended <1600-kcal but >800-kcal per week from physical activity,
3. Low; expended <800-kcal and >50-kcal per week from physical activity, and
4. Nil; expended <50-kcal per week from physical activity.

It is important to note, that the extent to which a person’s resting metabolic rate is not consistent with the average (1-kcal.kg^{-1}.hr^{-1}), the estimate will more closely reflect body weight and not the metabolic rate of the individual (Ainsworth et al.,

If respondents did not report their mass during the first survey, they were given the mean mass for their gender. If respondents did not report their mass during the second survey, but did during the first survey their mass data from the first survey was substituted into the second data set. Respondents who reported their mass as greater than 120 kilograms were recoded to a maximum of 120 kilograms. This did not effect the energy expenditure categorisation.
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1993). This categorical data analysis allowed sub-group analyses to be performed as is described in the following section.

5.8.4.1 Adequately or inadequately active

Based on the US Surgeon Generals Report, adequate or sufficient physical activity is open to interpretation (USDHHS, 1996). To date what constitutes adequate activity has remained controversial. Several methods (up to six were discussed in the Surgeon Generals Report) have been used to calculate an adequate physical activity level (using total time, energy expenditure and/or frequency of activity sessions required for health). However, no clear result was gained as to the best method of estimation as each method expressed different elements of the report (Bauman, Bellew et al., 1996). The current recommendations for physical activity include;

- U.S Surgeon General: individuals should expend 1000-kcal/week energy from physical activity (UDDHHS, 1996; see Section 2.3).

- American Heart Association: individuals should expend 700-kcal/week of energy from physical activity (Fletcher et al., 1995)

- Centre for Disease Control and American College of Sports Medicine: individuals should expend 200-kcal/day energy from physical activity (Pate et al., 1995)

It is important to appreciate that there are similarities between these different recommendations. Blair, Kohl et al. (1992) using the current recommendations, estimated that 800-kcal equates to 30 minutes of brisk walking per day conducted on most days of the week for an average person. Therefore, expending at least 800-kcal/week of energy from physical activity most accurately reflects the current Australian physical activity recommendations. Historically, this method has been used extensively by Australian researchers (Booth et al., 1997; Bauman, Bellew et al., 1996; Booth et al 1996a & 1996b; Bauman & Owen, 1991). Therefore, to allow for accurate comparison between previous NSW samples and the present research trials, the method used in the 1994 NSW Health Promotion Survey (Bauman, Bellew et al., 1996), was used in
this thesis. This method relies on the four activity categories discussed in Section 5.8.4. Therefore, individuals may be classified as adequately active to gain health benefits from physical activity, if they expend at least 800-kcal of energy from physical activity per week. This estimate allows the classification of the population into two levels:

1. those who are adequately or sufficiently active for health gain expend \( \geq 800 \)-kcal of energy from physical activity, and

2. those who are inadequately or insufficiently active for health gain expend \( \leq 799 \)-kcal of energy from physical activity (USDHHS, 1996).

These two categories are derived by combining the High and Moderate groups and the Low and Nil groups from the energy expenditure classification groups discussed in Section 5.8.4.

5.8.5 Stage of change analysis

The Stages of Change were determined using the data collected on current and previous participation in physical activity per week and each individual’s intention to be more active in the future (see Section 5.3.2). Further to individual Stage of Change being determined, changes in stage between each follow-up survey were evaluated.

5.8.5.1 Stage progression analysis

One advantage of using the Stage of Change is that change may be measured by progression through the Stages of Change (Prochaska & Velicer, 1997). Therefore, progressing from one stage to the next stage (eg., from PC to C) would be considered a success. Whilst no time frame for movement between the early Stages of Change exists, 2-months was considered adequate time in the present study for participants to initiate a change in intention and possibly behaviour. Therefore, after calculating each participant’s Stage of Change, movement between the stages was determined. Positive stage movement (eg., moving from PC to C) predicts movement towards a more active lifestyle and possible success of the self-help print intervention. Conversely negative stage
movement (eg., moving from C to P) predicts relapse and movement towards a sedentary lifestyle. Participants who remained in the same stage between follow-ups were considered to be stage stable.

When considering stage progression between baseline, 2- and 6-months, movement between the A and M stages required careful consideration. Participants who were in A or M at baseline and remained in A or M at the 2-month follow-up were considered to have progressed as they had maintained their active lifestyle and sufficient time had not elapsed for them to complete the movement into the M stage (namely 6-months, see Section 2.7.2). However, participants who were in A at baseline and remained in A at the 6-month follow-up were considered to have moved to M as sufficient time had elapsed for them to have moved into M. Whereas, participants who were in M at baseline and remained in M at 6-months were considered to have progressed as they had maintained their active lifestyle which is all that could be expected of them (see Appendix 1.2 for further information on stage movement classifications).

5.8.5.2 Movement through the Stages of Change from the inactive stages to active Stages of Change

Another method of determining successful adoption of a more active lifestyle uses movement through the Stage of Change model to assess categorical stage change. Combining the early inactive stages (PC, C & P) which are defined as people who are sedentary (PC & C) or inadequately active (P) and then combining the later stages (A & M) which are defined as adequately active, the progression from being inadequately active to adequately active can be determined and compared between groups.

5.8.5.3 Movement through the Stages of Change from the sedentary stages to active Stages of Change

An alternate method of analysing movement through the Stages of Change is to categorise the sedentary stages together (PC & C) as one group and those who are either trying to be more active or are already active (P, A & M) as another group (B.H., Marcus, personal communication, 17th July, 1998). This may be an effective method of determining movement through the stage model from being completely sedentary to attempting some behaviour change.
5.8.5.4 Processes of Change analysis

Each Process of Change, was individually scored on a five point Likert Scale from 1. Never to 5. Repeatedly. Consistent with the higher order of the Processes of Change (see Appendix A) the score from each of the five Behavioural Processes of Change and the five Cognitive Processes of Change were summed together. Thereafter, stage progression was analysed within each study group in terms of changes in the use of the Processes of Change (see Appendix I) and analysed separately in terms of their use as participant progressed or relapsed through the Stage of Change.

5.8.6 Assessing change in physical activity participation adjusted for baseline physical activity level

Adopting physical activity as a behaviour is not an all or none phenomenon, small increases may be added gradually into daily routines. Finding 2.5-hours per week (as the new recommendation states, see Section 2.3) to devote to physical activity may be a challenge for most of the currently sedentary people. However, accumulating smaller increases in physical activity over time may be a good way to begin increasing physical activity levels. Therefore, adding an hour of physical activity per week would be considered a substantial increase worthy of encouragement. Assessing change in physical activity participation in this thesis involved constructing a new variable, based on the change in reported physical activity levels between baseline and 2-months and between baseline and 6-months. Participants who reported an increase in physical activity (walking, moderate, vigorous and total physical activity) by at least 1-hour or more were compared to those whose activity level remained within 1-hour of or decreased from their baseline level*. This analysis was first conducted in the 1998 NSW Active Australia Campaign Evaluation report (Bauman et al., 1998b), whereby the most positive effects were demonstrated in the inadequately active proportion of the

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* The criterion of 1-hour was determined as a substantial enough increase in total physical activity that could be viewed as a conscious increase in physical activity participation and not simply due to random variation in one's daily routine. One hour was also determined to be a useful increase in physical activity as it is almost half way to meeting the threshold of the moderate physical activity recommendation (see Section 2.3).
sample at baseline. It was also noted that this group was less likely to decrease their physical activity prevalence. The report also noted that the inadequately active group within the baseline sample were more likely to increase their activity through increases in walking, as there were no significant effects in the moderate and vigorous physical activity categories (Bauman et al., 1998b). A similar type of analysis, including only those participants who increased their physical activity by at least 1-hour between follow-ups was reported by Smith et al. (2000) following a controlled intervention trial. Therefore, similar analyses were conducted in the present thesis to determine if the self-help intervention had any effect on the intervention groups’ inadequately active baseline sample.

5.8.6.1 Inadequately active but motivated to change – sub group analysis

A separate analysis on those participants’ who reported inadequate physical activity levels at baseline, but reported an intention to change their physical activity status was conducted*. The sub-group was constructed those people classified in the C and P stages.

Similar sub-sample data analysis (also using the 1-hour change category) was conducted in the NSW Health Active Australia campaign and showed, significantly more of the sub-sample increased their total physical activity and walking activity by at least 1-hour ($p < 0.001$; Bauman et al., 1998b).

5.9 Data analysis

Traditional intervention research data analysis is guided by the principle of Intention to Treat (Newell, 1992). Intention to Treat (ITT) analysis reduces the possibility of selection bias by analysing all participants enrolled in the study by the group they were randomly allocated to (Newell, 1992). Therefore, ITT ignores whether or not the subject received the intended intervention and whether or not they were followed-up. Intention to Treat analysis used in the present study used the mean substitution

* These participants were selected for separate analysis as they are the people most in need of the intervention as they are not presently active and are most likely to change their behaviour (as they intend to do so).
method, for those participants who were lost to follow-up, whereby the group mean at the particular data collection point was substituted for their missing data. The mean substitution method assumes that those people lost to follow-up would have changed with the mean of the group they were allocated to. This way mean change data is not affected.

Two alternate methods of analysis were also conducted during the course of this thesis. These methods involved analysing the data according to;

1. Treatment Received (TR; see Section 6.5), and
2. Treatment Received and Read (TR&R; Section 6.5).

Analysing the data by TR and TR&R can introduce the potential bias that the participants who were allocated to receive the intervention and did not receive it for some reason (eg., lost in the mail system) may differ systematically to the rest of the intervention group. However, statistical adjustment may be carried out if those who report receiving the intervention and those who do not differ significantly on their baseline socio-demographic and physical activity prevalence at baseline.

Analyses by TR were conducted to determine the effects of the intervention when it was actually recalled by the participants, because when analyses are conducted by ITT if a substantial proportion of the group do not receive the intended intervention materials their inclusion in the analyses may mask the effects of the intervention. This type of analysis has been reported in a previous physical activity intervention conducted in general practice, whereby the TR analysis supported and strengthened the results reported by ITT (Smith et al., 2000). TR analyses, therefore, allow a more thorough evaluation of the intervention. However, it is important to note that analysis by TR should be interpreted carefully as it has been reported to lead to misleading conclusions (Newell, 1992) as it may magnify the effects and one must always consider that it is inevitable that any intervention may not always be received or used as intended.

Further consideration of findings generated by TR and TR&R analyses should consider the attenuation of sample sizes and the reduced possibility of finding any effect at all. Further addition of the TR&R analyses allow a more detailed look at a
Illawarra RCT: Methods

‘dose-response’ relationship between simply recalling receiving the materials and then recalling receipt and reading the materials. Combined, the three levels of analyses give a more complete view of the intervention effects from generic randomised allocation to the intervention (regardless of receipt) to specified receipt and use of the intervention as intended.

To determine the outcomes of each hypothesis, several key outcomes were analysed by each of the three levels of analysis:

1. **Change in total physical activity minutes per week** (walking, moderate and vigorous physical activity and total activity per week) between baseline, 2- and 6-months (see Section 5.8.2).

2. **Proportion meeting a criterion of sufficient physical activity**, based on the proportion of participants who achieved the recommended level of 150-minutes of physical activity per week at baseline, 2- and 6-month (see Section 5.8.3).

3. **Adequate energy expenditure**, categorised by the proportion of participants who reach the recommended energy expenditure level (800-kcal per week) between baseline, 2- and 6-months (see Section 5.8.4.1).

4. **Stages of Change**
   
a. **Stage progression** (movement in a positive direction within the stage of change model) between baseline, 2- and 6-months (see Section 5.8.5.1).
   
b. **Categorical stage change** from inactive stages (PC, C & P) to active stage (A & M), between baseline, 2- and 6-months (see Section 5.8.5.2).
   
c. **Categorical stage change** from sedentary stages (PC & C) to active stage (P, A & M), between baseline, 2- and 6-months (see Section 5.8.5.3).

5. **Assessing change in physical activity participation adjusted for baseline level** based on proportions of participants who showed at least a 1-hour increase in physical activity prevalence (walking, moderate or vigorous physical activity as well as total physical activity) between baseline, 2- and 6-months, categorised by adequate energy expenditure (see Section 5.8.6).
a. **Inadequately active-sub group analysis** based on the number of participants classified as inadequately active (i.e., those participants classified as inadequately active by energy expenditure, inactive stage (PC, C and P) or sedentary stage (PC & C) who showed at least a 1-hour increase in physical activity prevalence (walking, moderate and vigorous physical activity as well as total physical activity) between baseline, 2- and 6-months (see Section 5.8.6.1).

It is important to note at this point that multiple analytic strategies were conducted as no standardised approach to analysing self-reported physical activity data has been established. Therefore, multiple cut-points for adequate or sufficient physical activity were used based on current or recognised recommendations for physical activity consistent with recent literature (see Section 5.8 for descriptive references for each analytic strategy). It was also important to undertake a very thorough and complete analysis of the data to reduce the possibility of missing significant findings with regard to the overall and specific effects of the intervention.

5.10 **Statistical analysis**

Bivariate and multivariate statistical analyses were conducted on group effects using SPSS® v6.0 for Windows (SPSS, 1993). The analysis was initially descriptive, providing estimates, rates and proportions to monitor the trends in physical activity participation rates.

To determine the significance of changes in participation rates the continuous physical activity data were further analysed using matched pairs statistics, including paired \( t \)-tests, McNemar's Chi Square* and repeated measures ANOVA. To quantify potentially important relationships odds ratios and confidence intervals were calculated using statistical software, Epi-info 6.04 (Epi-info, 1997).

Where significant results existed back-ward stepwise logistic regression modelling was conducted to determine whether there were any significant predictors of change.

* McNemars \( \chi^2 \) test of symmetry was also used for within subject changes (Cardinal & Sachs, 1995).
Logistic regression modelling is widely used to describe the relationship between the dependent variable and its independent variables. The main advantage of logistic regression is that potential confounders may be controlled within the model when estimating levels of association. The following co-variates were included in the model: group allocation (intervention or control group), age (over 40- or under 40-years of age), gender (male or female), marital status (coupled or single), language spoken at home (English or non-English), children living at home (yes or no), employment status (employed or unemployed), education level ($\geq$ or $<10$-years education), baseline intention to be more active (none, within next month and within next 6-months), BMI category (normal, underweight, overweight and obese), and baseline activity level (tertials specific to the sub-sample being tested).

A significance level of 0.05 was set for all statistical analyses.
6. Illawarra Randomised Controlled Trial: Results

6.1 Characteristics of the Illawarra RCT study sample

To ensure the Illawarra RCT study sample was representative of the population from which it was drawn, the study sample was compared to the original data set from which it was selected. The original 1995 IPAP Benchmark sample (n = 1,197) has already been shown to be a true representation of the Illawarra population, based on the most recently available 1991 census data (IPAP, 1996).

Neither the sample (n = 927) from the IPAP benchmark survey who consented to being re-contacted in September 1995 nor the Illawarra RCT sample (n = 760) who were re-contacted in September 1997 differed significantly from the original randomly selected IPAP sample in terms of physical or social demographics. However, there were slightly more male participants, participants with children and more participants with less than 10-years formal education in the Illawarra RCT sample (see Appendix K.11, Table K.10).

Furthermore, there were no significant differences between the original IPAP Benchmark data set (n = 1,197) and the sample of participants consenting to be re-contacted again in September 1997 (n = 462; see Appendix K.11, Table K.10). However, as expected the final Illawarra RCT study sample (n = 462) was less physically active than the samples from which it was drawn (see Appendix K.11, Table K.11), because the participants who were in the Maintenance stage in September 1995 and in 1997 were removed from the Illawarra RCT study sample (see Section 5.2). Consequently, the Illawarra RCT study sample was considered to be representative of the regional community from which they were drawn.

6.2 Illawarra RCT follow-up response rates

Up to 2,193 telephone calls were made in September 1997 in an attempt to contact the 902 potential participants (see Section 5.2). Complete interviews were obtained from 760 participants, resulting in a respondent response rate of 84% from the consenting sub-sample, (or 64% of the original IPAP Benchmark sample).
Of the 760 participants re-contacted, 744 (98%) consented to being re-contacted in the future. Up to 1,224 telephone calls were made in November 1997 in an attempt to contact the 456 Illawarra RCT participants (221* intervention participants and 235 control participants). Completed interviews were obtained from 427 participants, resulting in a respondent response rate of 94%. Of the 427 participants contacted, 418 (98%) consented to be followed-up again for the 6-month follow-up. A total of 938 telephone calls were made in March 1998 in an attempt to contact the remaining 418 participants (206 intervention and 212 control participants). Complete interviews were obtained form 356 participants resulting in a respondent response rate of 85%. Reasons for non-response from all three contact points are see Table 6.1.

Table 6.1: Total Illawarra sample respondent response rates for the baseline, 2- and 6-month follow-ups

<table>
<thead>
<tr>
<th>contact sample (n)</th>
<th>September 1997</th>
<th>November 1997</th>
<th>March 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>complete interview</td>
<td>760</td>
<td>427</td>
<td>356</td>
</tr>
<tr>
<td>refused interview</td>
<td>59</td>
<td>12</td>
<td>46</td>
</tr>
<tr>
<td>household refused interview</td>
<td>5</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>disconnected phone/moved</td>
<td>48</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>unavailable</td>
<td>19</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>unsuitable</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>terminated interview</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>no contact made</td>
<td>4</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

6.3 Comparability of the Illawarra RCT study groups

Baseline demographic and physical activity data for the intervention and control groups from the Illawarra RCT sample were compared to ensure the two groups were comparable. There were no significant differences between the two group’s social demographics in terms of gender, marital status, children living at home, education or employment status/occupation (see Table 6.2). There were more non-English

* Six intervention group participants withdrew consent to be involved in the study during the process evaluation of the self-help print intervention, (see Section 6.5).
speaking participants in the intervention group ($X^2$ (1, n= 462) = 9.49, $p < 0.01$) than in the control group.

### Table 6.2: Socio-demographic characteristics of the intervention and control groups

<table>
<thead>
<tr>
<th>socio-demographics</th>
<th>intervention group n = 227 (%)</th>
<th>control group n = 235 (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>47.1</td>
<td>38.3</td>
<td>3.34 (0.07)</td>
</tr>
<tr>
<td>female</td>
<td>52.9</td>
<td>61.7</td>
<td></td>
</tr>
<tr>
<td>marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>married/defacto</td>
<td>78.9</td>
<td>82.1</td>
<td>0.59 (0.44)</td>
</tr>
<tr>
<td>single/widow</td>
<td>21.1</td>
<td>17.9</td>
<td></td>
</tr>
<tr>
<td>children at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>62.6</td>
<td>70.6</td>
<td>3.12 (0.08)</td>
</tr>
<tr>
<td>no</td>
<td>30.4</td>
<td>23.0</td>
<td></td>
</tr>
<tr>
<td>missing</td>
<td>7.0</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>education level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10-years</td>
<td>45.8</td>
<td>54.5</td>
<td>3.12 (0.08)</td>
</tr>
<tr>
<td>≥ 10-years</td>
<td>54.2</td>
<td>45.5</td>
<td></td>
</tr>
<tr>
<td>occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>manager/professional</td>
<td>33.9</td>
<td>27.2</td>
<td>1.06 (0.30)</td>
</tr>
<tr>
<td>trades person</td>
<td>11.5</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>clerk</td>
<td>9.3</td>
<td>12.3</td>
<td></td>
</tr>
<tr>
<td>sales &amp; service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>personal</td>
<td>7.0</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>machine operator/labourer</td>
<td>13.2</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>no occupation*</td>
<td>24.7</td>
<td>30.2</td>
<td></td>
</tr>
<tr>
<td>missing</td>
<td>0.4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>origin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian</td>
<td>66.5</td>
<td>75.3</td>
<td>3.93 (0.05) #</td>
</tr>
<tr>
<td>other</td>
<td>33.5</td>
<td>24.7</td>
<td></td>
</tr>
<tr>
<td>main language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>91.6</td>
<td>98.3</td>
<td>9.49 (&lt;0.01) #</td>
</tr>
<tr>
<td>other</td>
<td>8.4</td>
<td>1.7</td>
<td></td>
</tr>
</tbody>
</table>

* includes students, unemployed and retired participants

*# indicates significant difference between groups

However, there were no significant differences between the intervention and control groups in terms of mean age, height, mass or body mass index (BMI; see Table 6.3).

### Table 6.3: Physical demographic comparisons between the intervention and control groups at baseline

<table>
<thead>
<tr>
<th></th>
<th>intervention group n = 227</th>
<th>control group n = 235</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (yrs)</td>
<td>49.2 ± 5.7</td>
<td>48.9 ± 5.7</td>
<td>-0.61</td>
<td>0.54</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.68 ± 0.10</td>
<td>-0.80</td>
<td>0.43</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>74.8 ± 15.2</td>
<td>74.2 ± 14.8</td>
<td>-0.43</td>
<td>0.67</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.3 ± 4.3</td>
<td>26.4 ± 4.6</td>
<td>0.22</td>
<td>0.82</td>
</tr>
</tbody>
</table>
There were no significant differences between the intervention and control groups in terms of baseline walking, moderate, vigorous and total physical activity performed with the previous week (see Table 6.4), although the intervention group reported a slightly lower prevalence across all four physical activity categories. Therefore, the intervention and control groups were considered to be similar in terms of demographic characteristics, and baseline physical activity participation levels.

Table 6.4: Mean weekly walking, moderate, vigorous and total physical activity time reported by the intervention and control groups at baseline

<table>
<thead>
<tr>
<th>physical activity (hours/week)</th>
<th>intervention group n = 227</th>
<th>control group n = 235</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>1.23 ± 1.65</td>
<td>1.44 ± 2.28</td>
<td>1.14</td>
<td>0.25</td>
</tr>
<tr>
<td>moderate</td>
<td>1.15 ± 2.11</td>
<td>1.19 ± 2.23</td>
<td>0.24</td>
<td>0.81</td>
</tr>
<tr>
<td>vigorous</td>
<td>0.63 ± 2.06</td>
<td>0.70 ± 2.52</td>
<td>0.31</td>
<td>0.76</td>
</tr>
<tr>
<td>total</td>
<td>3.01 ± 3.39</td>
<td>3.33 ± 4.10</td>
<td>0.93</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Despite 19 intervention and 16 control participants being lost to follow-up during the 2-month survey, the two study groups remained comparable in terms of age, height, mass and BMI (see Table 6.5). Therefore, the two study groups remained comparable at 2-months.

Table 6.5: Physical demographic comparisons between the intervention and control groups at 2-months

<table>
<thead>
<tr>
<th></th>
<th>intervention group n=208</th>
<th>control group n=219</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (yrs)</td>
<td>49.9 ± 5.7</td>
<td>48.8 ± 5.7</td>
<td>-0.49</td>
<td>0.62</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.69 ± 0.10</td>
<td>1.68 ± 0.10</td>
<td>-1.09</td>
<td>0.27</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>75.4 ± 15.2</td>
<td>74.6 ± 15.1</td>
<td>-0.52</td>
<td>0.60</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.4 ± 4.4</td>
<td>26.5 ± 4.7</td>
<td>0.26</td>
<td>0.79</td>
</tr>
</tbody>
</table>

An additional 33 intervention and 38 control group participants were lost to follow-up during the 6-month survey, however, the two study groups again remained comparable in terms of age, height, mass and BMI (see Table 6.6).
Table 6.6: Physical demographic comparisons between the intervention and control groups at 6-months

<table>
<thead>
<tr>
<th></th>
<th>intervention group</th>
<th>control group</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (yrs)</td>
<td>48.9 ±5.7</td>
<td>48.7 ±5.7</td>
<td>-0.50</td>
<td>0.62</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.69 ±0.10</td>
<td>1.69 ±0.09</td>
<td>-1.40</td>
<td>0.16</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>75.7 ±15.2</td>
<td>74.5 ±15.3</td>
<td>-0.78</td>
<td>0.43</td>
</tr>
<tr>
<td>BMI (kg/m$^2$)</td>
<td>26.4 ±4.1</td>
<td>26.5 ±4.9</td>
<td>0.21</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Although 15% of participants were lost to follow-up during the study, the two study groups remained comparable to each other and the community from which they were selected in terms of demographic characteristics, as well baseline physical activity level. This enabled accurate comparisons to be made between the two study groups in terms of the changes in their physical activity behaviour throughout the duration of the study. Furthermore, the small number of participants lost to follow-up may be due to the non-intrusive nature of the self-help print intervention and the minimalist data collection methods. Hence, the strategies used in this study may be considered more acceptable and non-threatening to most of community dwelling individuals who would not normally seek any support for changing their physical activity habits.

6.4 Background media influences on the Illawarra RCT study groups

There was a statistically significant decrease in message recall between baseline and 2-months ($\chi^2 (1, n = 427) = 12.46, p < 0.001$), and baseline and 6-months ($\chi^2 (1, n = 355) = 22.31, p < 0.001$) within the two study groups combined. Despite the control group recalling more general health related media at all three data collection points (see Figure 6.1), there was no statistically significant difference between the two study groups at; baseline ($\chi^2 (1, n = 462) = 1.11, p = 0.29$), 2-months ($\chi^2 (1, n = 427) = 0.54, p = 0.46$), or 6-months ($\chi^2 (1, n = 355) = 0.96, p = 0.33$) data. Furthermore, there were no significant differences between the number of intervention and control group participants who recalled specific physical activity related messages at; baseline (45% vs. 53%; $p = 0.46$) 2-months (38% vs. 49%; $p = 0.16$), or 6-months (25% vs. 28%; $p = 0.71$). Both groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation.
The data on the unprompted message recall by the two study groups are presented in Appendix J.2.

![Graph showing recall rates across groups and time points](image)

**Figure 6.1:** Proportions of the intervention and control groups who recalled a health message at baseline, 2- and 6-months

### 6.5 Process evaluation of the self-help print intervention

Process evaluation of the self-help print intervention was conducted approximately 4 to 6-weeks after the intervention was delivered to the intervention group through the mail. Two hundred and fifteen (97%) intervention group participants were contacted by telephone and participated in the process evaluation interview (see Appendix H.1 for the process evaluation questionnaire). Of those contacted, 134 (62%) recalled receiving the self-help print intervention (‘Active Living’ booklets) unprompted, 51 (24%) recalled the ‘Active Living’ booklets after a verbal prompt, 27 (13%) could not recall receiving the ‘Active Living’ booklets (and the booklets were resent), and three (1%) could not recall receiving the ‘Active Living’ booklets, and withdrew from the study.

Therefore, 185* (86%) of the intervention group participants who were contacted recalled receiving the ‘Active Living’ booklets in the mail. Of the 185 participants

* n = 185 are the participants included in the Treatment Received analysis reported in Section 6.13.
recalling the ‘Active Living’ booklets, 87% (n = 161)\* reported reading the booklet related to their physical activity Stage of Change. A further 30% of participants who recalled the ‘Active Living’ booklets reported they had discussed the booklet with someone else. The 24 participants who reported receiving the ‘Active Living’ booklets but had not read them, were not different in terms of the Stages of Change (PC & C, n = 13 and P, A & M, n = 11) or other socio-demographic characteristics.

Participants were also asked what they had done with the ‘Active Living’ booklets since receiving them. Fifty six per cent reported that they had kept the booklets and knew where they were. A further 26% reported that they had kept booklets but could not recall where they were. The remaining participants had either thrown them out (11%), had given them to someone else to read (2%), or could not recall what they had done with them (6%).

The participants were also asked whether they had tried to be more active since receiving the booklets, of which 56% reported they had. If the participant identified a barrier or problem with being more physically active, the interviewer offered a possible solution to the barrier from a standardised flow chart designed to overcome some of the more common barriers to physical activity (see Appendix H.2). As was expected the most common barrier reported by participants was a ‘lack of time’.

### 6.5.1 Process evaluation of the self-help print intervention at 2-months

The process evaluation questions were repeated during the 2-month follow-up survey. Of the 12 participants who were not contacted during the initial 4- to 6-week process evaluation (see Section 6.5) 10 were contacted during the 2-month follow-up. Of the 10 participants only two recalled the ‘Active Living’ booklets, and both of these reported reading the booklets.

---

\* n = 161 are the participants included in the Treatment Received and Read analysis reported in Section 6.14.
Of the other 208 intervention group participants contacted during the 2-month follow-up, 142 (68%) recalled receiving the ‘Active Living’ booklets unprompted. Of the 142 participants recalling the booklets 133 (64%) reported reading them.

A comparison between the process questions at 4 to 6 weeks and at 2-months, showed that only 171 of the participants who were successfully contacted at the first process call were re-contacted during the 2-month follow-up. Of the 171 participants recalling the ‘Active Living’ booklets at 4 to 6 weeks, only 138 recalled the booklets (81%) again. Therefore, 33 participants had forgotten the booklets in the 2 to 3 week period between follow-up telephone calls. However, the reported use of the materials was not significantly different between the 4 to 6 week evaluation and the 2-month follow-up ($X^2 (1, n = 138) = 0.82, p = 0.37$), despite the fact 13 participants who reported they did not read the booklets at 4 to 6 weeks, reported reading the materials during the 2-month follow-up.

6.6 Changes in reported physical activity between baseline, 2 and 6-months

Results reported in this Section compare changes in reported physical activity between the two study groups between 2- and 6-months. As reported in Section 6.3, there were no significant differences between the intervention and control groups in terms of their baseline walking, moderate and vigorous physical activity or their total physical activity levels at baseline.

6.6.1 Changes in walking participation reported by the intervention and control groups at baseline, 2 and 6-months

The intervention group increased their mean reported walking prevalence by 42-minutes per week between baseline (1.2 ± 1.7 hrs per week) and 2-months (1.9 ±

* It is important to note that the data presented in this Section, were analysed by Intention to Treat. Group means were substituted for participants’ data lost to follow-up. This method of data substitution assumes the participants changed with the mean of the group they were allocated to, such that complete data for every participant was available for analysis across the three data collection points (see Section 5.9).
2.5 hrs per week; see Figure 6.2). Whereas, the control groups’ mean reported walking only increased by 12-minutes per week between baseline (1.4 ± 2.3 hrs per week) and 2-months (1.6 ± 2.2 hrs per week).

Despite the 30 minute per week difference between groups means the difference was not statistically significant (\(F(1, n = 462) = 0.86, p = 0.35\)). However, there was a significant effect of time when the data were pooled across groups (\(F(1, n = 462) = 7.21, p = 0.001\)). Linear contrasts showed a significant difference between the mean walking time reported at baseline and 2-months (\(t = -3.65, p < 0.001\)), but not between baseline and 6-months (\(t = -1.10, p = 0.27\)). Furthermore, a significant group × time interaction (\(F(1, n = 462) = 3.22, p < 0.04\)) was observed.

To investigate the group × time interaction further, a one-way RM ANOVA was conducted on each study group separately. This analysis revealed that the intervention group demonstrated a significant difference between the mean
walking time reported at 2-months when compared to their mean baseline level \((F(1, n = 227) = 8.85, p < 0.001; t = -3.94, p < 0.001)\). This difference was not observed between the mean baseline and 6-month walking data \((t = 0.50, p = 0.96)\). The control group, however, did not demonstrate any significant differences between the mean reported walking time between the two time periods analysed \((F(1, n = 235) = 1.21, p = 0.30)\).

Additional analyses were conducted to determine whether the change in walking time was facilitated by an increase in walking for transport or walking for recreation. These data are presented in Appendix J, Section J.3. The only significant finding was there was a significant effect of time in the walking for transport category (see Figure J.1). There were no significant differences between the two study groups in either the walking for transport or the walking for recreation when analysed separately.

### 6.6.2 Changes in moderate physical activity participation reported by the intervention and control groups at baseline, 2 and 6-months

The intervention group reported a greater increase in mean moderate physical activity (+ 48-minutes per week; from 1.1 ± 2.1 to 1.9 ± 2.8 hrs per week) compared to the control group (+ 24-minutes per week; from 1.1 ± 2.2 to 1.6 ± 2.6 hrs per week) between baseline and 2-months (see Figure 6.3). Although there was no statistically significant difference between the two study groups \((F(1, n = 462) = 0.14, p = 0.70)\), a statistically significant effect across time was reported for the pooled group data \((F(1, n = 462) = 13.17, p < 0.001)\), where linear contrasts showed this to be significant between baseline and 2-months \((t = -4.76, p < 0.001)\), but not between the baseline and 6-months \((t = -0.73, p = 0.46)\). There was no significant group \(\times\) time interaction \((F(1, n = 462) = 1.98, p = 0.14)\), indicating no intervention effect over 6-months between the intervention and control groups for moderate physical activity.

Interestingly both study groups reported a decrease in mean moderate activity time reported during the 2- and 6-month follow-ups. While the intervention group’s
mean reported moderate activity decreased back towards the baseline mean, the control group maintained a 17-minute increase above its mean baseline level.

![Graph showing moderate physical activity time](image)

**Figure 6.3:** Average moderate physical activity time (hours per week ± standard deviation) reported by the intervention (n = 227) and control (n = 235) groups at baseline, 2 and 6-months

The most frequently reported moderate physical activity by the intervention and control group at all three data collection points was gardening. Other moderate physical activities reported at each data collection period are shown in Appendix J.3.

### 6.6.3 Changes in vigorous physical activity participation reported by the intervention and control groups at baseline, 2 and 6-months

Both study groups reported decreases in the time spent participating in vigorous-intensity physical activity, between the baseline and the 2-month follow-up (intervention group; minus 6-minutes per week, from 0.6 ± 2.1 to 0.5 ± 1.6 hrs per week and control group; minus 18-minutes per week, from 0.7 ± 2.5 to 0.4 ± 1.2 hrs per week; see Figure 6.4). Thereafter, the intervention group mean reported vigorous physical activity increased back towards their baseline level. In contrast,
the control group only increased their mean reported vigorous physical activity by 6-minutes per week, remaining well below their baseline level. However, the differences between the groups were slight and not statistically significant \( F(1, n = 462) = 0.07, p = 0.79 \). There was no significant effect when the data were pooled across time \( F(1, n = 462) = 1.98, p = 0.14 \), nor a group x time interaction \( F(1, n = 462) = 0.36, p = 0.70 \). Therefore, there were no significant effects demonstrated by either study group with respect to reported vigorous physical activity.

The most frequently reported vigorous physical activities by the intervention and control groups at baseline were heavy domestic duties and gym work. However, during the 2- and 6-month follow-ups the most frequently reported vigorous activities were swimming, gym work and cycling for the intervention group and swimming, gym work (weights and aerobics) and domestic duties by the control group (see Appendix J.4).

![Graph showing average vigorous physical activity time (hours per week ± standard deviation) reported by the intervention (n = 227) and control (n = 235) groups at baseline, 2 and 6-months.](image)

**Figure 6.4:** Average vigorous physical activity time (hours per week ± standard deviation) reported by the intervention (n = 227) and control (n = 235) groups at baseline, 2 and 6-months.
6.6.4 Changes in total physical activity participation reported by the intervention and control groups at baseline, 2 and 6-months

The intervention group reported an average 1-hour and 24-minute increase in total physical activity per week between baseline and 2-months (from $3.0 \pm 3.4$ to $4.4 \pm 4.3$ hrs per week), compared to the average 16-minute increase per week reported by the control group (from $3.3 \pm 4.1$ to $3.6 \pm 3.7$ hrs per week). Although this difference was not significant between groups ($F (1, n = 462) = 0.76, p = 0.38$), there was a statistically significant effect when the data were pooled across time ($F (1, n = 462) = 10.06, p < 0.001$). Linear contrasts revealed a statistically significant difference between the baseline and 2-month data ($t = -4.40, p < 0.001$), but not between the baseline and 6-month data ($t = -0.50, p = 0.62$). However, a significant group × time interaction ($F (1, n = 462) = 3.65, p = 0.02$) was observed indicating that data reported by the intervention group differed significantly from that reported by the control group. That is, the intervention group showed a significant effect across time ($F (1, n = 227) = 12.77, p < 0.001$), and the control group did not ($F (1, n = 235) = 1.0, p = 0.37$). Linear contrasts of the intervention group data confirmed a significant difference between baseline and 2-month reported total physical activity data ($t = -4.33, p < 0.001$).

In addition, the intervention group maintained a 20-minute increase in total physical activity participation above their baseline level at 6-months, and although this was not significant ($t = 1.70, p = 0.09$) it is noteworthy. Whereas, the control group reported an overall decrease in mean total physical activity (-7-minutes per week) below their baseline level at 6-months, this decrease was not statistically significant. Nonetheless, the trend existed for the intervention group to maintain more of the initial 2-month physical activity increase at 6-months. Therefore, these results indicate that the self-help print intervention was effective in increasing total physical activity participation in the intervention group up to 2-months and possibly helped them maintain some of that initial increase up to 6-months.
6.7 Proportions of the intervention and control groups meeting a 150-minute per week criterion of sufficient physical activity at baseline, 2 and 6-months

Results reported in this Section compare the proportion of intervention and control group participants who met the criterion of sufficient physical activity by participating in at least 150-minutes of physical activity per week (Bauman & Egger, 2000; Lesjak & Bauman, 1998; USDHHS, 1996) at baseline, 2- and 6-months (see Section 5.8.3).

Less than half of the intervention (45%) and control (43%) group participants were meeting the criterion at baseline. Hence, there was no statistically significant difference between the two study groups at baseline ($X^2 (1, n = 462) = 0.11, p = 0.74$).

There were statistically significant increases in the number of participants within both study groups’ reaching the 150-minute criterion at 2-months. Within the intervention group, 126 participants were doing <150-minutes of physical activity per week at baseline and 70 were doing ≥150-minutes per week at 2-months (McNemars
X^2 (1, n = 227) = 21.54, p < 0.001; see Table 6.7). Similarly within the control group, 59 out of the 135 participants who were doing <150-minutes at baseline were doing more than 150-minutes at 2-months (McNemars X^2 (1, n = 235) = 10.35, p = 0.001; see Table 6.7). However, it should be noted that the trend was for more of the intervention group participants (65%) to reach the criterion than the control group (56%) at the 2-month follow-up, and despite the 9% difference was not significant between groups (X^2 (1, n = 462) = 3.55, p = 0.06; OR = 1.46, 95% CI = 0.99-2.16).

Table 6.7: Proportion of intervention and control groups participating in at least 150-minutes of physical activity per week at baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-month n (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td>&lt; 150-minutes</td>
<td></td>
</tr>
<tr>
<td>intervention group</td>
<td>77 (34)</td>
<td>24 (11)</td>
<td></td>
</tr>
<tr>
<td>n = 227</td>
<td>70 (31)</td>
<td>56 (25)</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>72 (31)</td>
<td>28 (12)</td>
<td></td>
</tr>
<tr>
<td>n = 235</td>
<td>59 (25)</td>
<td>76 (32)</td>
<td></td>
</tr>
</tbody>
</table>

There were also statistically significant increases in the number of participants within both study groups reaching the 150-minute criterion at 6-months (intervention group 69 out of 126; McNemars X^2 (1, n = 227) = 16.50, p < 0.001; control group 75 out of 135; McNemars X^2 (1, n = 235) = 12.22, p < 0.001; see Table 6.8). Again, the trend was for more of the intervention group (63%) to reach the criterion than the control group (59%), but the 4% difference was not significant (X^2 (1, n = 462) = 0.60, p = 0.46; OR = 1.17, 95% CI = 0.79-1.74).

Table 6.8: Proportion of intervention and control groups participating in at least 150-minutes of physical activity per week at baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>6-month n (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td>&lt; 150-minutes</td>
<td></td>
</tr>
<tr>
<td>intervention group</td>
<td>73 (32)</td>
<td>28 (12)</td>
<td></td>
</tr>
<tr>
<td>n = 227</td>
<td>69 (30)</td>
<td>57 (25)</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>63 (27)</td>
<td>37 (16)</td>
<td></td>
</tr>
<tr>
<td>n = 235</td>
<td>75 (32)</td>
<td>60 (26)</td>
<td></td>
</tr>
</tbody>
</table>

Nonetheless, a strong trend was seen for more of the intervention group participants to report sufficient increases in their total physical activity to meet the 150-minute per
week criterion at 2-months compared to the control group, with a similar trend observed at 6-months. Therefore, these results indicate there may be some merit in providing the self-help print intervention to assist individuals to increase and maintain participation in physical activity over a 6-month period.

### 6.8 Proportions of the intervention and control groups expending adequate amounts of energy from physical activity at baseline, 2 and 6-months

Results reported in this Section compare the proportion of the intervention and control group participants who expended adequate amounts of energy from physical activity at baseline, 2- and 6-months (see Section 5.8.4).

At baseline the intervention and control groups reported similar proportions of participants in each energy expenditure category (see Table 6.9). In particular the proportion of participants in the adequate and inadequate energy expenditure categories* were very similar, with the 38% intervention and 37% of the control groups classified as adequately active at baseline.

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>intervention group n = 227</th>
<th>control group n = 235</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td></td>
<td>baseline</td>
<td>2-month</td>
</tr>
<tr>
<td>High</td>
<td>23 (10)</td>
<td>24 (11)</td>
</tr>
<tr>
<td>Moderate</td>
<td>64 (28)</td>
<td>108 (48)</td>
</tr>
<tr>
<td>Low</td>
<td>106 (47)</td>
<td>79 (35)</td>
</tr>
<tr>
<td>Nil</td>
<td>34 (15)</td>
<td>16 (7)</td>
</tr>
</tbody>
</table>

By the 2-month follow-up more of the intervention group participants (59%) were classified as adequately active, compared to the control group (52%). Similarly at 6 months 60% of the intervention group were classified as adequately active compared to

* The adequate physical activity category is made up of those participants expending high or moderate amounts of energy from physical activity as opposed to inadequate physical activity being a combination of those expending low or nil energy from physical activity (see Section 5.8.4.1).
only 54% of the control group (see Table 6.9). Therefore, these results support the notion that the self-help print intervention may have been effective in increasing the number of intervention group participants who were expending adequate energy from physical activity at 2- and 6-months.

To test this notion the 2-month data were statistically compared. A significant number of intervention group participants (32%) who were classified as inadequately active at baseline became adequately active by 2-months (McNemars $X^2 (1, n = 227) = 19.17, p < 0.001$; see Table 6.10). The control group also reported a similar significant trend (McNemars $X^2 (1, n = 235) = 13.29, p < 0.001$). The difference between the number of adequately active participants at 2-months between the two study groups was not significant but showed a trend for the intervention group to increase their energy expenditure from physical activity by more than the control group ($X^2 (1, n = 462) = 3.03, p = 0.08; \text{OR} = 1.55, 95\% \text{CI} = 0.95-2.55$).

| Table 6.10: Changes in adequate and inadequate energy expenditure categories in the intervention and control groups between baseline and 2-months |
|-------------------------------------------------|-----------------|-----------------|
|                                                   | baseline | adequate | inadequate |
| intervention group $n = 227$                      | inadequate | 73 (32) | 67 (30) |
|                                                   | adequate  | 59 (26) | 28 (12) |
| control group $n = 235$                          | inadequate | 61 (26) | 87 (37) |
|                                                   | adequate  | 61 (26) | 26 (11) |

There were also significant changes in the number of participants moving from the inadequate to adequate activity categories reported by both groups at 6-months (intervention group McNemars $X^2 (1, n = 227) = 21.53, p < 0.001$ and control group McNemars $X^2 (1, n = 235) = 14.08, p < 0.001$; see Table 6.11).

There was a trend for the intervention group to increase their energy expenditure by more than the control group at 2-months, and while not significant the trend continued to 6-months. This suggests that the self-help print intervention may have been somewhat effective in increasing energy expenditure from physical activity up to 2-months post baseline in the those study participants who received it.
Table 6.11: Changes in adequate and inadequate energy expenditure categories in the intervention and control groups between baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>adequate</th>
<th>inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 227</td>
<td>inadequate</td>
<td>78 (34)</td>
<td>62 (27)</td>
</tr>
<tr>
<td></td>
<td>adequate</td>
<td>58 (26)</td>
<td>29 (13)</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 235</td>
<td>inadequate</td>
<td>74 (31)</td>
<td>74 (31)</td>
</tr>
<tr>
<td></td>
<td>adequate</td>
<td>53 (23)</td>
<td>34 (14)</td>
</tr>
</tbody>
</table>

6.9 Movement through the Stages of Change

The results presented in this Section were confined to those participants who were successfully followed up either at 2- or 6-months because: i. the Stages of Change are theoretically derived from the participants past and current physical activity as well as their intention to change their behaviour at a particular time (see Section 5.8.5), and ii. movement to the final Stage of Change M, is defined by 6-months of regular participation in physical activity (see Section 2.7.2). Consequently, data could not be analysed by ITT (see Section 5.9), and only those participants with complete data at 6-months (i.e., n = 175 and n = 181 for the intervention and control groups) are presented in the following Sections.

The distribution of participant’s stage allocation was comparable between the two study groups at baseline (see Table 6.12), especially when considering the inactive (PC, C & P) stages compared to the active stages (A & M). There were 57% of participants in both groups staged in the inactive stages, and 40% and 39% of the intervention and control groups respectively represented in active stages. The sixth Stage of Change, R was also similar between the two study groups at baseline, but this stage was removed from further analyses.

* Combining the stages in this way is another method that may be used to define adequate and inadequate activity levels in a sample, see Section 5.8.5.2.

† These percentages do not add up to 100% because of the exclusion of the relapse stage (see Table 6.21).
Table 6.12: Stage distribution within the intervention and control groups at baseline

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>Intervention group n = 175</th>
<th>Control group n = 181</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>PC</td>
<td>18 (10)</td>
<td>20 (11)</td>
</tr>
<tr>
<td>C</td>
<td>27 (16)</td>
<td>36 (20)</td>
</tr>
<tr>
<td>P</td>
<td>54 (31)</td>
<td>47 (26)</td>
</tr>
<tr>
<td>A</td>
<td>22 (13)</td>
<td>20 (11)</td>
</tr>
<tr>
<td>M</td>
<td>47 (27)</td>
<td>50 (28)</td>
</tr>
<tr>
<td>R</td>
<td>6 (3)</td>
<td>7 (4)</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation, C = Contemplation, P = Preparation, A = Action & M = Maintenance.

At the 2-month follow-up there was a notable decrease in the number of participants in C and P in the intervention group and slight movement out of the PC and A stages (see Figure 6.6). Most participants who moved out of the C stage moved forward into the P (n = 11) and M (n = 10) stages. Most movement from the P stage was also to the M stage (P; n = 22, A; n = 7; see Appendix K, Table K.26). Similar stage movement was also observed in the control group (see Figure 6.7), where most movement from the early stages C and P stage also moved into the M stage (C; n=10, P; n=19, see Appendix K, Table K.27).

At the 6-month follow-up the C stage remained stable after the 2-month follow-up in both groups (see Figures 6.6 and 6.7). There were also slight increases in the P stages in both groups observed where most of the movement was back from the M stage (See Appendix K, Table K.26 and K.27). Hence, both study groups also showed a decrease in the M stage at 6-months compared to the 2-month data.
Figure 6.6: Movement through the Stages of Change between baseline, 2- and 6-months by the intervention group (n=175).

Figure 6.7: Movement through the Stages of Change between baseline, 2- and 6-months by the control group (n=181).

The proportion of participants in the R stage remained relatively unchanged in the intervention group over the course of the study but increased at 6-months in the control group, most of whom came from the M stage (see Figure 6.7). Interestingly,
the proportion of participants in PC remained relatively stable in both study groups over the course of the study. More fine tuned analyses of these data are presented in Sections 6.9.1, 6.9.3, and 6.9.4.

6.9.1 Progression through the Stages of Change between baseline, 2 and 6-months

The purpose of using the Stages of Change to develop an intervention is to encourage participants who receive the intervention to progress through the stages (see Section 5.8.5.1). Therefore, assisting a participant from PC to C would be considered a success. These results report the number of participants who progressed at least one stage vs. the participants who remained stable and/or relapsed (see Appendix I.2 for stage movement categories).

Data from all participants followed up at 2-months were evaluated in this Section, since progression in the early stages within the Stage of Change model is not dictated by the 6-month maintenance period. There was a significant difference between the number of participants in the intervention group progressing at least one stage between (63.9%) baseline and 2-months compared to the control group participants' (53.0%); Yates Corrected $X^2$ (1, n = 424) = 4.77, $p = 0.03$; OR = 1.57, 95% CI = 1.05-2.37; see Table 6.13).

Table 6.13: A comparison between the intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 205</td>
<td>131 (64)</td>
<td>74 (36)</td>
</tr>
<tr>
<td>control group n = 219</td>
<td>116 (53)</td>
<td>103 (47)</td>
</tr>
</tbody>
</table>

Stage progression between baseline and 6-months used the data only from the participants followed up at 6-months. The intervention group showed a stronger trend for stage progression 59% (vs. 50% in the control group), but the difference between groups was not significant (Yates Corrected $X^2$ (1, n = 354) = 2.31, $p = 0.13$; OR = 1.42, 95% CI = 0.91-2.20; see Table 6.14).
Table 6.14 A comparison between the intervention and control group participants who progressed at least one stage between baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 174</td>
<td>102 (59)</td>
<td>72 (41)</td>
</tr>
<tr>
<td>control group n = 219</td>
<td>90 (50)</td>
<td>95 (50)</td>
</tr>
</tbody>
</table>

Therefore, it would seem that the intervention group, who received the self-help print intervention, were significantly more likely to report positive stage progression between baseline and 2-months compared to the control group. By the 6-month follow-up the trend remained for more of the intervention group to report stage progression compared to the control group but the difference between groups was not significant.

6.9.2 Use of the Processes of Change between baseline, 2 and 6-months in those participants who reported stage progression

Similar proportions of each study group reported using each of the 10 Processes of Change at baseline (see Appendix K, Table K.1). Change in the use of each Process of Change was then examined within each study group in terms of use of the processes by those participants who progressed at least one Stage and those who relapsed or remained stable stage between baseline and 2-months and baseline and 6-months (see Section 6.9.1). These data revealed no significant change in the use of the Processes of Change in either the intervention or control groups between baseline and 2-months (see Appendix K, Table K.2) nor baseline and 6-months (see Appendix K, Table K.3). Therefore, it became clear that the 10-item Processes of Change question used in this thesis was not adequate enough to gain a thorough understanding of the Processes of Change. Nonetheless, some specific analyses were undertaken with regard to the change in the use of the Processes of Change in those participants classified in PC, C and P at baseline, who progressed or remained stage stable between baseline, 2- and 6-months (see Appendix K, Sections K.3 to K.9). These results produced inconsistent change in the use of the processes, thus it was confirmed that the 10-item Process of Change question was indeed inadequate. In addition analyses of the higher order construct
of the Processes of Change, the Behavioural and Cognitive Processes of Change were conducted (see Appendix K, Section K.10). These data began to resemble what the Process of Change represent relative to the Stages of Change (see Section K.10). Furthermore, with group analyses revealed that the intervention group who progressed at least one stage between baseline and 2-months were significantly more likely to use the behavioural Processes of Change at 2- and 6-months as compared with their baseline usage (see Section K.10.1). However, further analyses or discussion of the results surrounding the 10-item Process of Change question is not warranted in this thesis apart from the recommendation that if the Processes of Change are to be evaluated the original 40-item question (Marcus, Rossi et al., 1992) should be used.

6.9.3 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 6-months

Combining the early inactive stages (PC, C & P) and the later active stages (A & M) enables the progression from the inadequately active stages to adequately active stages to be determined (see Section 5.8.5.2). However, as it turned out the results of these analyses were comparable to the energy expenditure data presented in the previous Section 6.8. Therefore, to prevent repetition of results the data for the categorical stage change analyses are presented in Appendix K and the main results presented here.

Both the intervention and control groups showed significant stage change from the inactive stages to the more active stages between baseline and 2-months. However, the difference between the two study groups' in terms of stage change between baseline and 2-months was not significant (see Appendix K, Section K.11).

The 6-month data produced favourable results indicating that the intervention group reported significant stage change between baseline and 6-months, unlike the control group who did not. However, despite this the difference between the two study groups in terms of stage change between baseline and 6-months was not significant (see Appendix K, Section K.12).
6.9.4 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 6-months

An alternative method of analysing stage change is to categorise the sedentary stages together (PC & C) as one group and those who are either trying to be more active or are already active (P, A & M) as another group.

The intervention group reported significant alternate stage change from the sedentary stages to the more active stages between baseline and 2-months, whereas, the control group did not. However, further analysis between the two study groups in terms of alternate stage change between baseline and 2-months was not significant ($p = 0.07$; see Appendix K, Section K.13)

The 6-month data again indicated that the intervention group (unlike the control group) demonstrated significant alternate stage change between baseline and 6-months. However, as before this did not translate into a significant difference between the intervention and control groups in terms of alternate stage change between baseline and 6-months ($p = 0.50$; see Appendix K, Section K.14).

6.10 Changes in reported physical activity at 2-months adjusted for baseline physical activity level

The results presented in this Section were based on individual participant’s change in reported physical activity between baseline and 2-months. Firstly any amount of change in the three separate physical activities (walking, moderate and vigorous physical activity) were considered, then changes in total physical activity participation were evaluated. There was a trend for greater proportion of intervention group participants to increase their reported physical activity across all three activity categories (see Table 6.15).

However, the difference between the proportions of the intervention (63%) and control (60%) groups’ who increased their total physical activity at 2-months was not significant (Yates Corrected $X^2 (1, n = 462) = 0.17, p = 0.68$). Nonetheless, a favourable trend was established as more of the intervention group participants
reported an increase in their physical activity participation between baseline and 2-months than the control group.

Table 6.15: A comparison between the intervention and control group participants who increased their reported physical activity level between baseline and 2-months

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Intervention Group n = 227 n (%)</th>
<th>Control Group n = 235 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased Activity*</td>
<td>Remained Stable#</td>
</tr>
<tr>
<td>Walking</td>
<td>134 (59)</td>
<td>62 (27)</td>
</tr>
<tr>
<td>Moderate</td>
<td>120 (53)</td>
<td>57 (25)</td>
</tr>
<tr>
<td>Vigorous</td>
<td>56 (25)</td>
<td>33 (15)</td>
</tr>
<tr>
<td>Total</td>
<td>144 (63)</td>
<td>71 (31)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by any amount
# reported physical activity stayed the same
§ reported physical activity decreased by any amount

Additional analysis of the physical activity change data involved evaluating change based on at least a 1-hour increase in physical activity between baseline and 2-months (see Section 5.8.6). These data were then categorically compared to those participants who remained stable (within 1-hour of their baseline level) or decreased their total physical activity prevalence by at least 1-hour or more. As before, walking, moderate, vigorous and total physical activity were evaluated.

The intervention group had a greater proportion of participants’ increase their physical activity by at least 1-hour between baseline and 2-months across all three physical activity categories compared to the control group (see Table 6.16). Furthermore, these results translated to more of the intervention group (52%) increasing their total physical activity participation by at least 1-hour than the control group (43%), however, the difference was not significant (\(X^2 (1, n = 462) = 3.39, p = 0.07; \text{OR} = 1.44, 95\% \text{ CI} = 0.98-2.11\)). Nonetheless, a favourable trend was established for those participants who received the self-help print intervention to report greater increases of at least 1-hour of physical activity between baseline and 2-months.
Table 6.16: A comparison between intervention and control groups who increased their physical activity by at least 1-hour increase between baseline and 2-months

<table>
<thead>
<tr>
<th>physical activity</th>
<th>intervention group n = 227 (%)</th>
<th>control group n=235 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>increased 1-hour*</td>
<td>within 1-hour#</td>
</tr>
<tr>
<td>walking</td>
<td>32</td>
<td>52</td>
</tr>
<tr>
<td>moderate</td>
<td>38</td>
<td>46</td>
</tr>
<tr>
<td>vigorous</td>
<td>9</td>
<td>79</td>
</tr>
<tr>
<td>total</td>
<td>52</td>
<td>28</td>
</tr>
</tbody>
</table>

* reported at least a 1-hour increase in physical activity
# reported physical activity remained within 1-hour
§ reported at least a 1-hour decrease in physical activity

6.10.1 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

The results in this Section relate to the difference between the two study groups’ participants who were inadequately active at baseline (classified by energy expenditure, see Section 6.8) and increased their total physical activity by at least 1-hour between baseline and 2-months*.

A significant number of the intervention groups’ inadequately active baseline participants (41%) increased their total physical activity status by at least 1-hour between baseline and 2-months compared to their adequately active baseline counterparts (McNemars $X^2 (1, n = 227) = 5.32, p = 0.02$; see Table 6.17). This significant change was not observed in the control group with only 33% of the inadequately active baseline participants reporting the 1-hour increase in total physical activity at 2-months (McNemars $X^2 (1, n = 235) = 1.01, p = 0.32$; see Table 6.17).

* This analysis was important because it is the inadequately active who need to be targeted in interventions, as they are the individuals most likely to suffer from the ill effects of an inactive lifestyle.
Table 6.17: A comparison between intervention and control groups adequately and inadequately active baseline participants classified by energy expenditure who increased their total physical activity by at least 1-hour between baseline and 2-months

<table>
<thead>
<tr>
<th>groups classified by energy expenditure category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>87 (38.3)</td>
<td>23 (10)</td>
<td>64 (28)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>140 (61.7)</td>
<td>94 (41)</td>
<td>46 (20)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>87 (37.0)</td>
<td>22 (9)</td>
<td>65 (28)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>148 (63.0)</td>
<td>78 (33)</td>
<td>70 (30)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by < 1-hour, remained the same or decreased by any amount

Further analysis was conducted between the intervention and control groups’ inadequately active baseline samples. A statistically significant difference between the intervention and control groups’ was observed between the number of inadequately active participants at baseline reporting at least a 1-hour increase in total physical activity between baseline and 2-months ($\chi^2 (1, n = 288) = 5.65, p = 0.02$; see Table 6.18). This meant that the inadequately active intervention group participants at baseline were 1.83 times (95% CI = 1.11-3.05) more likely to increase their total physical activity by at least 1-hour, compared to the inadequately active control group participants.

Table 6.18: A comparison of the inadequately active baseline intervention and control participants classified by energy expenditure who increased their total physical activity by at least 1-hour between baseline and 2-months

<table>
<thead>
<tr>
<th>inadequately active</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>140 (61.7)</td>
<td>94 (32.6)</td>
<td>46 (16.0)</td>
</tr>
<tr>
<td>control group</td>
<td>148 (63.0)</td>
<td>78 (27.1)</td>
<td>70 (24.3)</td>
</tr>
</tbody>
</table>
Backward step-wise logistic regression* was conducted on the data from the inadequately active baseline samples in each study group to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months. All variables† except for group allocation and education level were removed via the backward elimination method (Model Fit; \(X^2 = 9.9, p = 0.007\) (-2 log likelihood = 353.27). The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline were; i. being in the intervention group (OR = 1.88, 95% CI = 1.13-3.13), and ii. reporting <10-years education (OR = 1.75, 95% CI = 1.05-2.94; see Table 6.19).

Table 6.19: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active baseline sample classified by energy expenditure

<table>
<thead>
<tr>
<th>Variable *</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td>0.63</td>
<td>0.26</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>group (intervention)</td>
<td>0.63</td>
<td>0.26</td>
<td>0.01</td>
<td>1.88 (1.13-3.13)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>0.63</td>
<td>0.26</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.55</td>
<td>0.26</td>
<td>0.09</td>
<td>0.57 (0.34-0.95)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: age (p = 0.5); gender (p = 0.4); marital status (p = 0.9); child at home (p = 0.4); employment status (p = 0.2); language (p = 0.7); BMI (p = 0.6); baseline intention (p = 0.4); baseline activity (p = 0.9).

† The backward elimination method removes the least significant variable from the equation until the most significant model is obtained.

Variables coded into dichotomous values and entered into the model as follows, group allocation (control or intervention group), gender (male and female), marital status (those married or in a defacto relationship and those single or widowed), language (those who speak English at home and other languages), age (≤50 years and >50 years), children living at home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded accordingly were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), BMI (normal, underweight, overweight and obese), baseline activity level (<28-minutes per week, ≥28 to 90-minutes per week and ≥90-minutes per week). Variables not coded dichotomously were treated as dummy variables and adjusted odds ratio was compared to the first category with in each variable.
Therefore, these results indicate that the self-help print intervention (with a follow-up telephone call) was effective in promoting a significant increase in reported physical activity between baseline and 2-months and that it was especially effective in promoting physical activity to inadequately active and less educated participants in the sample.

**6.10.2 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change**

This Section describes the results of the 1-hour change data between baseline and 2-months as categorised by those people classified as inactive by the stage change analysis described in Section 6.9.2, but as before the complete results are presented in Appendix K, Section K.11.1, and a summary is presented here.

This analysis showed that the inactive staged intervention group participants were significantly more likely to increase their total physical activity by at least 1-hour at 2-months compared to the active staged intervention group participants at baseline ($p < 0.001$; see Appendix K, Table K.10). Furthermore, the inactive staged intervention group participants at baseline were $1.86$ (95% CI = 1.11-3.19) times more likely to increase their total physical activity by at least 1-hour at 2-months compared to the inactive staged control group participants at baseline ($X^2 (1, n = 269) = 5.64, p = 0.02$; see Appendix K, Table K.11).

Logistic regression indicated that being in the intervention group (OR = 2.03, 95% CI = 1.20-3.45), and having <10-years education (OR = 2.04, 95% CI = 1.16-3.45) were significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants at baseline (see Appendix K, Table K.12).
6.10.3 A Comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

This Section describes the results of the 1-hour change data between baseline and 2-months and is limited to those participants classified as sedentary by the alternate stage change analysis described in Section 6.9.3. The complete results are presented in Appendix K, Section K.13.1, and a summary is presented here.

This analysis showed that the intervention group participants categorised as inactive by stage at baseline were significantly more likely to increase their total physical activity by at least 1-hour at 2-months compared to the active staged intervention group participants at baseline ($p < 0.001$; see Appendix K, Table K.19). However, there was no significant difference between the two study groups in terms of the number of sedentary staged participants at baseline who increased their total physical activity by at least 1-hour at 2-months ($\chi^2 (1, n = 155) = 1.08, p = 0.30$; see Appendix K, Table K.20).

Logistic regression indicated that having <10 years education (OR = 2.27, 95% CI = 1.10-4.76) was the only significant predictor of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline (see Appendix K, Table K.21).

6.11 Changes in reported physical activity at 6-months adjusted for baseline physical activity level

The results in this Section are based on the same principles as those applied in Section 6.10, but examined the changes in reported physical activity between baseline and 6-months. Again walking, moderate, vigorous and total physical activity categories were evaluated.

The intervention group data showed that more participants increased their time spent walking between baseline and 6-months (56%) compared to the control group participants (46%), but that similar proportions of each group reported increases in total physical activity at 6-months (58% of the intervention and 57% of the control groups; see Table 6.20).
Table 6.20: A comparison between the intervention and control group participants who increased their reported physical activity level between baseline and 6-months

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Intervention Group n = 227</th>
<th>Control Group n = 235</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased activity</td>
<td>Remained stable</td>
</tr>
<tr>
<td>Walking</td>
<td>126 (56)</td>
<td>62 (36)</td>
</tr>
<tr>
<td>Moderate</td>
<td>107 (47)</td>
<td>75 (33)</td>
</tr>
<tr>
<td>Vigorous</td>
<td>91 (40)</td>
<td>38 (17)</td>
</tr>
<tr>
<td>Total</td>
<td>131 (58)</td>
<td>89 (39)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by any amount
# reported physical activity remained the same
§ reported physical activity decreased by any amount

The baseline to 6-month 1-hour physical activity change data indicated that more of the intervention group increased their walking, vigorous physical activity prevalence by at least 1-hour compared to the control group, but the reverse trend was observed with moderate physical activity (see Table 6.21). Nonetheless, over 44% of the intervention group reported at least a 1-hour increase in total physical activity between baseline and 6-months compared to only 40% of the control group, but this difference was not statistically significant ($\chi^2 (1, n = 462) = 0.78, p = 0.38; OR = 1.20, 95\% CI = 0.82-1.77)$.

Table 6.21: A comparison between intervention and control groups who increased their reported physical activity

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Intervention Group n = 227</th>
<th>Control Group n = 235</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased 1-hour</td>
<td>Within 1-hour</td>
</tr>
<tr>
<td>Walking</td>
<td>32</td>
<td>51</td>
</tr>
<tr>
<td>Moderate</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td>Vigorous</td>
<td>11</td>
<td>78</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>28</td>
</tr>
</tbody>
</table>

* reported at least a 1-hour increase in physical activity
# reported physical activity remained within 1-hour
§ reported at least a 1-hour decrease in physical activity
6.11.1 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by energy expenditure

The results in this Section relate to the difference between the two study group participants’ who were inadequately active at baseline (classified by energy expenditure, see Section 6.8) and increased their total physical activity by at least 1-hour between baseline and 6-months.

The intervention group data showed that although 84 of the inadequately active participants at baseline increased their total physical activity by at least 1-hour compared to only 16 of the adequately active baseline sample, but this difference was not statistically significant (McNemars $\chi^2 (1, n = 227) = 0.93, p = 0.34$; see Table 6.22). Similarly 80 of the inadequately active control group participants’ at baseline also reported increase in total physical activity of at least 1-hour between baseline and 6-months, but this was also not significant (McNamars $\chi^2 (1, n = 235) = 0.16, p = 0.69$; see Table 6.22).

Table 6.22: A comparison between intervention and control groups’ adequately and inadequately active baseline participants classified by energy expenditure who increased their total physical activity by at least 1-hour between baseline and 6-months

<table>
<thead>
<tr>
<th>groups classified by energy expenditure category</th>
<th>reported physical activity increased by $\geq$ 1-hour at 6-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>16 (7)</td>
<td>71 (31)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>84 (37)</td>
<td>56 (25)</td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>13 (6)</td>
<td>74 (31)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>80 (34)</td>
<td>68 (30)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by <1-hour, remained the same or decreased by any amount

Despite more of the inadequately active intervention group participants at baseline (n = 84) reporting at least a 1-hour increase in their total physical activity at 6-
months than the equivalent control group participants (n = 80), the difference was not statistically significant (Yates corrected $X^2 (1, n = 288) = 0.81, p = 0.37; OR = 1.27, 95% CI = 0.78-2.09; see Table 6.23). Therefore, it would appear that the effectiveness of the self-help print intervention shown at 2-months was diminished by 6-months.

Table 6.23: A comparison of the inadequately active baseline intervention and control participants classified by energy expenditure who increased their total physical activity by at least 1-hour between baseline and 6-months

<table>
<thead>
<tr>
<th>inadequately active</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 6-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>140 (61.7)</td>
<td>84 (37)</td>
<td>56 (25)</td>
</tr>
<tr>
<td>control group</td>
<td>148 (63.0)</td>
<td>80 (34)</td>
<td>68 (30)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by < 1-hour, remained the same or decreased by any amount

Nonetheless, backward step-wise logistic regression was conducted using only the data from the inadequately active baseline samples from each study group to determine any significant variables that may predict change (Model Fit; $X^2 = 26.37, p < 0.001 (-2 \text{ log likelihood} = 341.98; \text{ see Table 6.24}).

All variables except for gender, education and baseline intention were removed from the model. Therefore, the significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the inadequately active participants at baseline were; i. being male (OR = 2.21, 95% CI = 1.27-3.81), ii. reporting <10-years education (OR = 1.79, 95% CI = 1.05-3.03), and iii. intending to be more active in the next month at baseline (OR = 3.72, 95% CI = 1.90-7.22) and intending to be more active in the next 6-months at baseline (OR = 3.24, 95% CI = 1.65-6.27; see Table 6.24).
Table 6.24: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active baseline sample classified by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender (male)</td>
<td>0.79</td>
<td>0.28</td>
<td>0.00</td>
<td>2.21 (1.27-3.81)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.57</td>
<td>0.27</td>
<td>0.03</td>
<td>0.56 (0.33-0.95)</td>
</tr>
<tr>
<td>intention (none)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intention (next month)</td>
<td>1.31</td>
<td>0.34</td>
<td>0.00</td>
<td>3.72 (1.90-7.22)</td>
</tr>
<tr>
<td>intention (next 6-months)</td>
<td>1.17</td>
<td>0.34</td>
<td>0.00</td>
<td>3.23 (1.65-3.27)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation (p = 0.3); age (p = 0.5); marital status (p = 0.7); child at home (p = 0.6); employment status (p = 0.7); language (p = 0.4); BMI (p = 0.4); baseline activity (p = 0.1).

6.11.2 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by inactive Stages of Change

This Section describes the results of the 1-hour change data between baseline and 6-months as categorised by those people classified as inactive by the stage change analysis described in Section 6.9.2, but as before the complete results are presented in Appendix K, Section K.12.1, and a summary presented here.

This analysis showed that the inactive staged intervention group participants were significantly more likely to increase their total physical activity by at least 1-hour at 6-months compared to the active staged intervention group participants at baseline (p < 0.001; see Appendix K, Table K.15). However, this did not translate in to a significant difference between two study groups in terms of number of inactive staged participants at baseline who increased their total physical activity by at least 1-hour at 6-months (χ² (1, n = 269) = 1.24, p = 0.46; see Appendix K, Table K.16).
Logistic regression indicated that being male (OR = 2.37, 95% CI = 1.34-4.17), having <10-years education (OR = 1.81, 95% CI = 1.05-3.13), as well as intending to be more active in the next month at baseline (OR = 3.70, 95% CI = 1.79-7.65) and intending to be more active in the next 6-months at baseline (OR = 3.21, 95% CI = 1.53-6.79) were all the significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants at baseline (see Appendix K, Table K.17).

6.11.3 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by sedentary Stages of Change

This Section describes the results of the 1-hour change data between baseline and 2-months as categorised by those people classified as sedentary by the alternate stage change analysis described in Section 6.9.3, but as before the complete results are presented in Appendix K, Section K.14.1, and a summary presented here.

This analysis showed that the sedentary staged intervention group participants were significantly more likely to increase their total physical activity by at least 1-hour at 6-months compared to the active staged intervention group participants at baseline ($p < 0.04$; see Appendix K, Table K.23). However, again this did not translate to a significant difference between the intervention and control group sedentary staged participants at baseline who increased their total physical activity by at least 1-hour at 6-months ($X^2 (1, n = 155) = 0.62$, $p = 0.80$; see Appendix K, Table K.24).

Again logistic regression indicated that being male (OR = 4.24, 95% CI = 1.89-9.43), and reporting an intention to be more active within the next month at baseline (OR = 3.55, 95% CI = 1.63-7.80) were both significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the sedentary staged participants at baseline (see Appendix K, Table K.25).
6.12 Maintenance of behaviour change from 2- to 6-months between the intervention and control groups

This Section describes those participants in the intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and maintained that increase at 6-months. Out of the 227 intervention and 235 control group participants followed-up at 6-months, 75 intervention and 55 control participants maintained the 1-hour increase in total physical activity they had reported at 2-months at the 6-month follow-up. The difference in proportions was statistically significant between groups indicating that the intervention group participants who increased their total physical activity by 1-hour between baseline and 2-months were 1.61 times (95% CI = 1.05-2.48) more likely to maintain this increase up to 6-months than the control participants (Yates Corrected $\chi^2 (1, n = 462) = 4.83, p = 0.03$).

6.13 Results of the Treatment Received analysis

The results of the Illawarra RCT analysed by Treatment Received (TR) are presented in full in Appendix L and are summarised in relation to the ITT analysis in Section 6.15. The TR intervention group consisted of 185 participants at 2-months and 142 participants at 6-months (see Appendix L, Table L.1). There were no significant differences between the TR intervention and control groups in terms of the group demographics and mean baseline physical activity data (see Appendix L, Table L.2). Similarly there were no significant difference between the two study groups in terms of background media recall (see Appendix L, Section L.1). Therefore the TR intervention and control groups were comparable.

6.13.1 Changes in reported physical activity between baseline, 2 and 6-months in the TR intervention group

Analysis by TR did not notably alter the results reported from the ITT analyses presented in Section 6.6. A significant group x time interaction was identified for walking time, which indicated that the TR intervention group was significantly more likely to report increases in walking between baseline and 2-months than the control group ($F (1, n = 185) = 10.52, p < 0.001$; see Appendix L, Section L.2).
Similar results were reported for moderate and vigorous physical activity, with no significant group × time interactions observed. Again as with the ITT analyses (see Section 6.6.4) there was a significant group × time interaction observed in total physical activity, indicating that the TR intervention group were significantly more likely to increase their total physical activity between baseline and 2-months compared to the control group ($t = -4.04, p < 0.001$), but not between baseline and 6-months ($t = -1.44, p = 0.15$; see Appendix L, Section L.2).

### 6.13.2 Proportion of the TR intervention group the U.S Surgeon General's physical activity criterion at baseline, 2 and 6-months

A significant number of TR intervention group participants who were not reaching the 150-minute criterion at baseline increased their physical activity to met the criterion by the 2-month follow-up (McNemars $\chi^2 (1, n = 185) = 18.5, p < 0.001$) (see Table L.5). However, there was a significant increase observed in the number of control group participants meeting the criterion at 2-months (see Section 6.7), but there was no significant difference between the two study groups in terms of the number of participants meeting the criterion at 2-months (Yates corrected $\chi^2 (1, n = 420) = 3.21, p = 0.07$; OR = 1.47, 95% CI = 0.97-2.22). Therefore, the TR results were no different to the ITT results at 2-months.

Similar results were reported at 6-months (see Table L.5), with the TR intervention group again demonstrating a significant number of participants were being physically activity at least 150-minutes a week (McNemars $\chi^2 (1, n = 142) = 14.63, p < 0.001$). Similarly there was no difference between the two study groups in terms of the number of participants meeting the criterion at 6-months (Yates corrected $\chi^2 (1, n = 420) = 0.71, p = 0.40$; OR = 1.21, 95% CI = 0.80-1.83).

### 6.13.3 Proportion of the TR intervention group expending adequate amounts of energy from physical activity at baseline, 2 and 6-months

There was a significant increase in the number of TR intervention group participants moving from the inadequate energy expenditure categories to the adequate categories between baseline and 2-months (McNemars $\chi^2 (1, n = 185) =$
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15.61, \( p < 0.001 \) and baseline and 6-months (McNemars \( \chi^2 \) (1, \( n = 185 \)) = 17.97, \( p < 0.001 \); see Appendix L, Section L.4), but the difference from the control group was not significant.

6.13.4 Stage progression between baseline, 2 and 6-months by the TR intervention group

Consistent with the ITT stage progression results (see Section 6.9.1) the TR intervention group participants were 1.57 times more likely to progress at least one stage by 2-months compared to the control group (\( \chi^2 \) (1, \( n = 388 \)) = 4.24, \( p = 0.04 \); 95% CI = 1.02-2.42; see Table L.9).

Similarly at the 6-month follow-up the difference in stage progression between the TR intervention and control groups was no longer significant (\( \chi^2 \) (1, \( n = 322 \)) = 1.95; \( p = 0.16 \); OR = 1.41, 95% CI = 0.88-2.25; see Table L.10).

6.13.5 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 6-months in the TR intervention group

Similar results were also observed in the ITT (see Appendix K, Section K.11) and TR (see Appendix L, Section L.7.4) analyses of stage change (from the inactive stages PC, C & P to the active stages A & M), insomuch that significant stage changes were observed within the TR intervention group between baseline and 2-months. Also consistent with the ITT results there was no significant difference between the TR intervention and control groups in terms of stage change between baseline and 2-months.

Similarly a significant number of the inactive staged TR intervention group participants move in to the active stages by 6-months (McNemars \( \chi^2 \) (1, \( n = 136 \)) = 6.22, \( p = 0.01 \); see Appendix L, Section L.5.2), but again the difference between the two study groups was not significant.
6.13.6 Movement through the Stages of Change from the sedentary stages to the more active stages between baseline, 2 and 6-months in the TR intervention group

Similar results were observed by alternate stage change (PC & C vs. P, A & M) when analysed by ITT and TR. Significant changes were observed within the TR intervention group between baseline and 2-months (McNemars $X^2 (1, n = 158) = 5.16, p = 0.02$) and between baseline and 6-months (McNemars $X^2 (1, n = 136) = 5.44, p = 0.02$) (see Appendix J, Section K.3 and Section K.4 and Appendix L.8).

However, like the ITT results (see Section 6.9.3, and Appendix K, Section K.13) there was no significant difference observed between the two study groups (Yates Corrected $X^2 (1, n = 122) = 3.52, p = 0.06; \text{OR} = 2.18, 95\% \text{CI} = 0.97-4.92$) alternate stage change between baseline and 2-months. Also like the ITT analyses the alternate stage change between groups was not significant between baseline and 6-months (see Appendix L, Section L.5.3).

6.13.7 Changes in the TR intervention groups physical activity level at 2-months adjusted for baseline physical activity level

6.13.7.1 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

The inadequately active TR intervention group participants at baseline were 1.92 times more likely to increase their total physical activity by an hour between baseline and 2-months than the inadequately active control group participants at baseline (95\% CI = 1.12-3.29; see Appendix L, Section L.6.1). This result was slightly better than the result observed in the ITT analyses (see Section 6.10.1).

As was reported in the ITT analyses (see Section 6.10.1) a significant predictor increasing total physical activity by at least 1-hour in the inadequately active baseline sample between baseline and 2-months was group allocation. This indicated that the TR intervention group were 1.93 times more likely (95\% CI = 1.13-3.25) to report this increase than the control group. Unlike the ITT
results education was retained in the model but was not an independently significant predictor of change (see Appendix L, Section L.6.1).

6.13.7.2 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change

The inactive staged TR intervention group participants at baseline were 1.96 times more likely to increase their total physical activity by an hour between baseline and 2-months than the inactive staged control group participants at baseline (95% CI = 1.12-3.43; see Appendix L, Section L.6.2). This result was slightly better than the result observed in the ITT analysis (see Section 6.10.2).

Furthermore, as was reported in the ITT analyses (see Section 6.10.2) significant predictors of change in the TR analysis were group allocation and education. Whereby the inadequately active TR intervention group participants were 2.08 times (95% CI = 1.20-3.57) more likely than the control group to increase their total physical activity by at least1-hour between baseline and 2-months. Similarly the inadequately active participants who reported <10-years education were 1.96 times (95% CI = 1.11-3.45), and those who were employed were 1.94 times (95% CI = 1.03-3.62) more likely to report the 1-hour increase in total physical activity between 1-hour between baseline and 2-months (see Appendix L, Table L.18). The odds ratio for group allocation was slightly higher in the TR model but the education odds ratio was slightly lower. Employment status was a new predictor in the TR analysis, not previously observed in the ITT analysis.

6.13.7.3 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

The sedentary staged TR intervention group participants at baseline were no more likely to report stage change between baseline and 2-months than the sedentary staged control group participants at baseline (OR = 1.54, 95% CI = 0.75-3.19; see
Appendix L, Section L.6.3. This result was similar to the ITT analysis (see Section 6.10.2).

Furthermore, logistic regression revealed being male (OR = 2.38, 95% CI = 1.07-5.33), and ii. having <10 years education (OR = 2.22, 95% CI = 1.04-4.55) as significant predictor of the sedentary staged participants at baseline increasing their total physical activity by at least 1-hour between baseline and 2-months (see Appendix L, Table L.21).

6.13.8 Changes in the TR intervention groups physical activity level at 6-months adjusted for baseline physical activity level

6.13.8.1 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by energy expenditure

The inadequately active TR intervention group participants at baseline were not significantly more likely to increase their total physical activity by an hour between baseline and 6-months when compared to the inadequately active control group participants at baseline (OR = 1.25, 95% CI = 0.74-2.10; see Appendix L, Section L.7.1). This result was no different to the ITT analysis (see Section 6.11.1).

Logistic regression revealed that significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the inadequately active participants at baseline were; i. being male (OR = 2.30, 95% CI = 1.27-4.13), ii. intending to be more active in the next month at baseline (OR = 3.31, 95% CI = 1.77-6.22) and intending to be more active in the next 6-months at baseline (OR = 3.29, 95% CI = 1.62-6.66; see Appendix L, Table L.24).

6.13.8.2 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by inactive Stages of Change

The inactive staged TR intervention group participants at baseline were not significantly more likely to increase their total physical activity by an hour
between baseline and 6-months when compared to the inactive staged control group participants at baseline (OR = 1.21, 95% CI = 0.71-2.09; see Appendix L, Section L.7.2). As before this result was no different to the ITT analysis (see Section 6.11.2).

Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants at baseline defined by logistic regression were; i. being male (OR = 2.61, 95% CI = 1.39-4.89), ii. having <10-years education (OR = 1.82, 95% CI = 1.03-3.23) and iii. intending to be more active in the next month at baseline (OR = 3.49, 95% CI = 1.59-7.64) and intending to be more active in the next 6-months at baseline (OR = 3.13, 95% CI = 1.43-6.85) and iv. participating in <25 minutes per week at baseline (OR = 2.08, 95% CI = 1.06-4.00, compared to those doing ≥90-minutes per week at baseline; see Appendix L, Table L.27).

6.13.8.3 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by sedentary Stages of Change

Similarly the sedentary staged TR intervention group participants at baseline were not significantly more likely to increase their total physical activity by an hour between baseline and 6-months when compared to the sedentary staged control group participants at baseline (OR = 1.27, 95% CI = 0.62-2.61; see Appendix L, Section L.7.3). This result was no different to the ITT analysis (see Section 6.11.3).

Logistic regression defined being male (OR = 5.04, 95% CI = 2.18-11.74), ii. reporting an intention to be more active within the next month at baseline (OR = 3.70, 95% CI = 1.63-8.44) as the only significant predictor of increasing total physical activity by at least 1-hour between baseline and 6-months in the sedentary staged participants at baseline (see Appendix L, Table L.30).
6.13.9 Maintenance of behaviour change from 2- to 6-months between the TR intervention and control groups

The TR intervention group participants who reported a 1-hour increase in physical activity at 2-months were 1.61 times (95% CI = 1.02-2.53) more likely to maintain the 1-hour increase in physical activity at 6-months than the control group ($\chi^2 (1, n = 420) = 4.27, p = 0.04$; see Section L.8). This result was the same as the ITT result (see Section 6.12).

6.14 Results of the Treatment Received & Read analysis

The Illawarra RCT results of the data analysed by Treatment Received & Read (TR&R) are presented in full in Appendix M and are summarised in relation to the ITT and TR analysis in Section 6.16. The TR&R intervention group consisted of 161 participants at 2-months and 124 participants at 6-months (see Appendix M, Table M.1). Despite having 66 fewer participants in the TR&R intervention group there were no significant differences between the TR&R intervention and control groups in terms of baseline demographics and mean baseline physical activity data (see Appendix M, Table M.2). Similarly there were no significant differences between the two study groups in terms of background media recall (see Appendix M, Section M.1). Therefore the TR&R intervention and control groups were comparable.

6.14.1 Changes in reported physical activity between baseline, 2 and 6-months in the TR&R intervention group

Analysis by TR&R did not notably alter the results reported from the ITT analyses presented in Section 6.6. A significant group x time interaction was reported for walking time, which indicated that the TR&R intervention group were more significantly more likely to report increases in walking between baseline and 2-months than the control group ($F (1, n = 150) = 3.01, p = 0.05$; see Appendix M, Section M.2).

Similar results were reported for moderate and vigorous physical activity, with no significant group x time interactions observed. Again as with the ITT analyses (see Section 6.6.4) there was a significant group x time interaction observed in total physical activity, indicating that the TR&R intervention group were significantly
more likely to increase their total physical activity between baseline and 2-months compared to the control group ($t = -3.43, p < 0.001$), but not between baseline and 6-months ($t = 1.18, p = 0.24$; see Appendix M, Section M.2).

Therefore, these results were similar the ITT and TR results presented in Section 6.6 and 6.13.1.

6.14.2 Proportion of the TR&R intervention group meeting the U.S Surgeon General’s physical activity criterion at baseline, 2 and 6-months

A significant number of TR&R intervention group participants who were not reaching the 150-minute criterion at baseline increased their physical activity to met the criterion by the 2-month follow-up (McNemar’s $X^2 (1, n = 150) = 14.8, p < 0.001$) (see Table M.5). However, despite the control group also reporting significant increases (see Section 6.7), there was a significant difference between the two study groups. The TR&R intervention group were 1.64 more likely to be meeting the 150-minute criterion at 2-months than the control group (Yates corrected $X^2 (1, n = 385) = 4.66, p = 0.03; 95\% \text{ CI} = 1.04-2.57$). This indicated that those intervention group participants who reported receiving and reading the self-help print intervention were more likely to increase their physical activity above the 150-minute threshold compared to the control group participants at 2-months. Therefore, the TR&R results were different to the ITT and TR results at 2-months.

However, similar results were reported at 6-months (see Table M.5), with the TR&R intervention group again demonstrating a significant number of participants were being physically activity at least 150-minutes a week (McNemar’s $X^2 (1, n = 142) = 14.63, p < 0.001$). Similarly there was no difference between the two study groups in terms of the number of participants meeting the criterion at 6-months (Yates corrected $X^2 (1, n = 385) = 2.97, p = 0.09; \text{OR} = 1.49, 95\% \text{ CI} = 0.95-2.35; \text{see Appendix M, Section M.3}$).
6.14.3 Proportions of the TR&R intervention group expending adequate amounts of energy from physical activity at baseline, 2 and 6-months

There was a significant increase in the number of TR&R intervention group participants moving from the inadequate energy expenditure categories to the adequate categories between baseline and 2-months (McNemars $\chi^2 (1, n = 150) = 13.73, p < 0.001$) and baseline and 6-months (McNemars $\chi^2 (1, n = 150) = 15.41, p < 0.001$). However, unlike the ITT and TR analysis the difference between the TR&R intervention and control group was significant (Yates Corrected $\chi^2 (1, n = 240) = 4.06, p = 0.04$). Indicating that those intervention group participants who actually reported receiving and reading the self-help print intervention were 1.77 times (95% CI = 0.01-3.11) more likely to be adequately active at 2-months compared to the control group (see Appendix M, Section M.4).

6.14.4 Stage progression in the TR&R intervention group between baseline, 2 and 6-months

Consistent with the ITT stage progression results (see Section 6.9.1) the TR&R intervention group participants were 1.61 times more likely to progress at least one stage by 2-months than the control group ($\chi^2 (1, n = 357) = 4.14, p = 0.04; 95\% CI = 1.02-2.56$; see Appendix M, Section M.5.1).

In contrast the ITT and TR analysis (see Section 6.9.1 and Section 6.13.4) there was a significant difference between the TR&R intervention and control groups participants who progressed through the Stages of Change between baseline and 6-months ($\chi^2 (1, n = 294) = 2.71, p = 0.10$; OR = 1.53, 95% CI = 1.93-2.54; see Appendix M, Section M.5.1). Therefore, contrary to previous results the TR&R intervention group maintained significant level of stage progression over the control group at 6-months. Hence, it appeared that those participants who received and read the self-help print intervention as intended were significantly more likely to progress through the Stages of Change model as opposed to the intervention group counterparts who did not recognise or read the intervention as intended.
6.14.5 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 6-months stage change in the TR&R intervention group

Similar results were observed in the ITT (see Appendix K, Section K.11) and TR&R (see Appendix M, Section M.7.4) analyses of stage change (from the inactive stages PC, C & P to the active stages A & M), insomuch that significant stage changes were observed within the TR&R intervention group between baseline and 2-months. However, in contrast to the ITT and TR results (see Section 6.9.2 and Section 6.13.5), there was a significant difference between the TR intervention and control group participants who moved from the inactive stages to the active stages was significant (Yates Corrected $\chi^2 (1, n = 220) = 4.57, p = 0.03$). Therefore, the TR&R intervention group participants who were in PC, C or P at baseline were 1.63 (95% CI = 0.92-2.89) times more likely to be in A & M at 2 months.

As with the 2-month data a significant number of the TR&R intervention group participants moved from the inactive stages at baseline to the active stages by 6-months (McNemars $\chi^2 (1, n = 108) = 6.12, p = 0.01$; see Appendix M, Table M.11). However, the difference between the TR intervention and control group participants who moved from the inactive stages to the active stages at 6-months was again not significant (Yates Corrected $\chi^2 (1, n = 178) = 1.40, p = 0.24$; OR = 1.55, 95% CI = 0.78-3.08). These 6-month results were not different to the ITT and TR results (see Section 6.9.2 and Section 6.13.5).

6.14.6 Movement through the Stages of Change from the sedentary stages to the more active stages between baseline, 2 and 6-months in the TR&R intervention group

Similar results were observed by alternate stage change (PC & C vs. P, A & M) when analysed by ITT and TR. Significant changes were observed within the TR&R intervention group between baseline and 2-months (McNemars $\chi^2 (1, n = 128) = 3.84, p = 0.05$) and between baseline and 6-months (McNemars $\chi^2 (1, n = 128) = 1.08, p = 0.04$) (see Appendix K, Section K.13 and Section K.14 and Appendix L.8).
However, unlike the ITT results (see Section 6.9.3, and Appendix K, Section K.13) and consistent with the TR results (see Section 6.13.6) the difference between the TR&R intervention and control group participants who moved from the inactive stages to the active stages was significant (Yates Corrected $X^2$ (1, n = 128) = 108, $p = 0.04$). This indicated that the TR&R intervention group participants who were in PC & C at baseline were 2.63 (95% CI = 0.92-2.89) times more likely to be in P, A & M at 2-months compared to the control group participants. Therefore, it would seem that those intervention group participants who actually reported receiving and reading the self-help print intervention were significantly more likely to move from being sedentary to the more active Stages of Change between baseline and 2-months compared to the control group and those in the ITT analyses.

Again like the ITT and TR analyses the difference between the TR&R intervention and control group participants who moved from the sedentary stages to the active stages at 6-months was not significant (Yates Corrected $X^2$ (1, n = 86) = 2.08, $p = 0.15$; OR = 2.21, 95% CI = 0.79-6.29; see Appendix M, Section M.5.3)

6.14.7 Changes in the TR&R intervention groups physical activity levels at 2-months adjusted for baseline physical activity level

6.14.7.1 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

The inadequately active TR&R intervention group participants at baseline were 2.16 times more likely to increase their total physical activity than the control group at 2-months (95% CI = 1.20-3.90; see Table M.14). This result was slightly better than the result observed in the ITT and TR analysis (see Section 6.10.1, Section 6.13.7.1).

Again logistic regression revealed that the TR&R intervention group were 2.15 times (95% CI = 1.22-3.81) more likely to increase their total physical activity than the control group. As with the TR results, education was removed from the TR&R logistic regression model (see Appendix M, Table M.15).
6.14.7.2 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change

The inactive staged TR&R intervention group participants at baseline were 2.26 times more likely to move into A & M at 2-months compared to the control group (95% CI = 1.22-4.21; see Table M.17). Again this result was slightly better than the result observed in the ITT and TR analyses (see Section 6.10.2 and Section 6.14.7.2).

Furthermore, as was reported in the ITT and TR analyses (see Section 6.10.2) group allocation was again shown to be a significant predictor of change indicating that the TR&R intervention group were 2.42 times (95% CI = 1.33-4.47) more likely to increase their total physical activity than the control group. However, education and employment status were removed from the model in the TR&R logistic regression analysis (see Appendix M, Table M.18).

6.14.7.3 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

As with the ITT and TR analyses (see Section 6.9.3 and Section 6.13.7.3) the sedentary staged TR&R intervention group participants at baseline were not significantly more likely to report stage change between baseline and 2-months than the sedentary staged control group participants at baseline (OR = 1.75, 95%CI = 0.78-3.97; see Appendix M, Section M.6.3).

The logistic regression model retained group allocation, gender, education and BMI, however, none of the variables were individually significantly predictors of increasing total physical activity by at least 1-hour between baseline and 2-month in the sedentary staged participants at baseline (see Appendix M, Table M.21).
6.14.8 Changes in the TR&R intervention groups physical activity levels at 6-months adjusted for baseline physical activity level

6.14.8.1 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by energy expenditure

The inadequately active TR&R intervention group participants at baseline were not significantly more likely to increase their total physical activity by an hour between baseline and 6-months when compared to the inadequately active control group participants at baseline (OR = 1.45, 95% CI = 0.82-2.56; see Appendix M, Section M.7.1). This result was no different to the ITT and TR analyses (see Section 6.11.1 and Section 6.13.8.1).

Logistic regression revealed that significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inadequately active participants at baseline were; i. being male (OR = 2.06, 95% CI = 1.11-3.89), ii. having <10-years education (OR = 1.85, 95% CI = 1.03-3.33), iii. intending to be more active in the next month at baseline (OR = 3.43, 95% CI = 1.64-7.28) and intending to be more active in the next 6-months at baseline (OR = 3.30, 95% CI = 1.53-7.06; see Appendix M, Table M.24).

6.14.8.2 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by inactive Stages of Change

The inactive staged TR&R intervention group participants at baseline were not significantly more likely to increase their total physical activity by an hour between baseline and 6-months when compared to the inactive staged control group participants at baseline (OR = 1.45, 95% CI = 0.80-2.64; see Appendix M, Section M.7.2). Again this result was no different to the ITT and TR analyses (see Section 6.11.2 and Section 6.13.8.2).

Logistic regression reported that; i. being male (OR = 2.27, 95% CI = 1.19-4.34), ii. having <10-years education (OR = 1.85, 95% CI = 1.01-3.45) and iii.
intending to be more active in the next month at baseline (OR = 3.53, 95% CI = 1.52-8.19) and intending to be more active in the next 6-months at baseline (OR = 3.33, 95% CI = 1.40-7.86) and iv. speaking English at home (OR = 5.88, 95% CI = 1.10-33.33), were all significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants at baseline (see Appendix M, Table M.27).

6.14.8.3 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by sedentary Stages of Change

Similarly the sedentary staged TR&R intervention group participants at baseline were not significantly more likely to increase their total physical activity by an hour between baseline and 6-months when compared to the sedentary staged control group participants at baseline ((OR = 1.75, 95%CI = 0.78-3.97; see Appendix M, Section M.7.3). Yet again, this result was no different to the ITT and TR analyses (see Section 6.11.3 and Section 6.13.8.3).

Logistic regression again revealed that; i. being male (OR = 4.69, 95% CI = 1.84-12.07), and ii. reporting an intention to be more active within the next month at baseline (OR = 4.79, 95% CI = 1.84-7.29) were both significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the sedentary staged participants at baseline (see Appendix M, Table M.31).

6.14.9 Maintenance of behaviour change from 2- to 6-months between the TR&R intervention and control groups

The TR&R intervention group participants who reported a 1-hour increase in physical activity at 2-months were more 1.69 times (95% CI = 1.15-2.72) more likely to maintain the 1-hour increase in physical activity at 6-months than the control group ($X^2 (1, n = 385) = 4.63, p = 0.03$; see Section M.8). A slightly larger odds ratio was observed with the TR&R analysis than the ITT and TR analyses (see Section 6.12 and Section 6.13.9).
6.15 Summary of the main findings

Based on all the results presented in this Chapter it would appear that the self-help print intervention was moderately successful when analysed by ITT. The following four tables provide a summary of all the results presented in this Chapter and in the supplementary Appendices.

The first two tables in this section summarise the results of each outcome variable (previously described in Section 5.8). The Tables also include results from the within group analyses as well as the between group analyses across each analytic strategy (ITT, TR and TR&R).

Table 6.25 summarises the results between baseline and 2-months, and shows that regardless of the analytic strategy (ITT, TR or TR&R) the differences between the two study groups were significant for change in total physical activity participation time per week. Interestingly, as shown in the second last column of Table 6.25 the TR&R results showed the greatest number of significant differences between groups. More importantly where the difference between groups was almost significant in the ITT (namely in the number of participants doing at least 150-minutes if physical activity per week, expending adequate energy expenditure and movement through the Stages of Change), were shown to be significant in the TR&R analysis. Therefore, it appears that as the analysis became more specific in terms of receipt and use of the self-help print intervention the differences between the groups became larger in terms of increasing odds ratios.

Table 6.26 summarises the results between baseline and 6-months. When compared to the previous Table 6.25 it appears the self-help print intervention had most influence between baseline and 2-months, with little difference shown between the two study groups at the 6-month follow-up (regardless of analytic strategy, ITT, TR or TR&R). This may be because the intervention, a one off mailing of self help print materials may be a too far in the past by 6-months to be recalled let alone have any impact on behaviour.

The last two Tables (Table 6.27 and Table 6.28) summarise the results of the logistic regression analyses. Upon comparing the results of the ITT, TR and TR&R an important finding presented in Table 6.27 is that the odds ratio demonstrating the
The other interesting finding in the baseline to 2-month logistic regression analysis was the significance of those participants who were considered to be the least educated in the groups (<10 years formal education) reporting significant odds ratios for increasing their total physical activity by at least 1-hour. However, the importance of this finding diminished as the analyses became more specific in terms of receipt and use of the intervention materials (or may be due to the decrease in sample size; see Table 6.27).

The effects of the self-help print intervention were no longer evident between the intervention and control groups at 6-months as no significant effect from group allocation (see Table 6.28). Other co-variates such as gender, education and baseline intention were significant predictors of increasing reported physical activity between baseline and 6-months. The effects of the self-help print intervention had weakened by the 6-month follow-up.

Nonetheless, the outcomes were similar across the different measures of physical activity and Stage of Change at both the 2- and 6-month follow-ups. The ITT analyses had the most statistical power to detect change due to the larger sample sizes. Furthermore, there was no greater significance observed in the TR and TR&R analyses possibly due to the attenuation of the intervention group. However, it should be noted that the TR and TR&R analyses do suggest an increased intervention effect as the odds ratios increased as the analyses became more refined under these terms. Further discussion of these results are presented in Chapter 7.
### Table 6.25: Summary of the Illawarra RCT findings by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 2-months

<table>
<thead>
<tr>
<th>Physical Activity Outcome Measures</th>
<th>Intention to Treat *</th>
<th>Treatment Received **</th>
<th>Treatment Received &amp; Read***</th>
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<td>intervention group (w)</td>
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<td></td>
<td></td>
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<tr>
<td>- moderate activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>- vigorous activity</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>- total activity</td>
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<td>-</td>
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<tr>
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<td>●</td>
</tr>
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<td></td>
</tr>
<tr>
<td>- baseline to 6-months</td>
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<td>●</td>
<td>●</td>
</tr>
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</tr>
<tr>
<td>- inactive-active</td>
<td>●</td>
<td>●</td>
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<tr>
<td>- sedentary-active</td>
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<td>- inactive stage of change</td>
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<tr>
<td>Change in mean physical activity minutes per week</td>
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<tr>
<td>- baseline to 2-months</td>
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<td>Maintenance of behaviour change between 2- &amp; 6-months</td>
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<td></td>
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* Intention to Treat: group means substituted for missing data
** Treatment Received: includes only the Intervention group members who reported receiving the self-help print intervention
*** Treatment Received & Read: includes only the Intervention group members who reported receiving and reading the self-help print intervention

(w) Results from within group change analyses

- $p \leq 0.05$
- $p \leq 0.001$
- $0.05 < p < 0.1$
- not significant
- analysis not applicable
### Table 6.26: Summary of the Illawarra RCT findings by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 6-months

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<th>Intention to Treat* intervention group (w)</th>
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<th>Treatment Received** intervention group (w)</th>
<th>Treatment Received &amp; Read*** between groups</th>
<th>Treatment Received &amp; Read*** intervention group (w)</th>
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* Intention to Treat: group means substituted for missing data

** Treatment Received: includes only the Intervention group members who reported receiving the self-help print intervention

*** Treatment Received & Read: includes only the Intervention group members who reported receiving and reading the self-help print intervention results from within group change analyses

- $p \leq 0.05$
- $p \leq 0.001$
- $0.05 < p < 0.1$
- not significant
- analysis not applicable
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<th>Variables entered into the model</th>
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* all odds ratios listed are significant $p \leq 0.05$

* Intention to Treat: group means substituted for missing data

** Treatment Received: only intervention group members who reported receiving the self-help print intervention

*** Treatment Received & Read: only intervention group members who reported receiving and reading the self-help print intervention

V includes only inadequately active participants by energy expenditure

W included only participants staged in PC, C & P

WWW included only participants staged in PC & C

Reference category
Table 6.28: Summary of the Illawarra RCT significant odds ratios* defined by logistic regression analysis by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 6-months

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<th>Treatment Received &amp; Read ***</th>
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<tr>
<td></td>
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</table>

* all odds ratios listed are significant \( p \leq 0.05 \)

* Intention to Treat: group means substituted for missing data

** Treatment Received: only intervention group members who reported receiving the self-help print intervention

*** Treatment Received & Read: only intervention group members who reported receiving and reading the self-help print intervention

\( V \) includes only inadequately active participants by energy expenditure

\( VV \) included only participants staged in PC, C & P

\( VVV \) included only participants staged in PC & C
7. Illawarra Randomised Controlled Trial: Summary Discussion

The purpose of the Illawarra RCT was to evaluate the effectiveness of a self-help print intervention delivered through the mail as a strategy to promote physical activity to a representative sample of adults aged between 40- and 60-years of age, living in a regional community in the State of NSW. The intervention was planned because of the accumulating scientific evidence on the benefits of moderate physical activity and the lack of effective intervention strategies suitable for broad-based dissemination (see Chapter 2).

Prior to the self-help print intervention being evaluated in the community sample, the booklets underwent comprehensive assessment to ensure they were both appealing and acceptable to the target audience (see Chapter 3).

The Illawarra RCT included participants who were originally interviewed to provide a Benchmark for the Illawarra Physical Activity Project (IPAP, 1996). Thereafter, the participants were recontacted as part of the present trial and randomly allocated to either receive or not receive the self-help print intervention through the mail (see Section 5.2 and Section 5.5). All data were collected by self-report telephone interviews. The self-help print intervention was delivered approximately 1-week after the baseline data were collected. Process evaluation of receipt and use of the intervention materials was conducted at 4- to 6-weeks. Thereafter, the effectiveness of the self-help print intervention as a method of promoting physical activity was determined by comparing the self-report physical activity data (see Section 5.3) collected at 2- and 6-months post baseline (see Section 5.4) between the intervention and control groups, using the analytic strategies described in Sections 5.8, 5.9 and 5.10.

This study was one of the first population-based, targeted intervention strategies to be evaluated using a pro-actively recruited random sample. Another unique feature
of this study was that if the self-help print intervention was shown to be successful, it had the potential to be distributed population-wide.

This Chapter presents a summary discussion of the main findings of the Illawarra RCT presented in Chapter 6, and summarised in Tables 6.22 to 6.25 (supplementary results were presented in Volume 2, Appendix J, Appendix K, Appendix L and Appendix M).

### 7.1 Main findings of the Illawarra RCT

Consistent with the randomisation process, the study groups were shown to be comparable in terms of demographic characteristics and baseline physical activity levels. In addition there were no differences observed between the two study groups in terms of background media recall (see Section 6.4, Appendix L and Appendix M). Therefore, it is unlikely that any differences found between the two study groups at the 2- and 6-month follow-ups were due to differences between the two groups (see Section 6.3).

Good follow-up response rates were obtained during both the 2- and 6-month follow-ups (94% and 85% respectively), which are comparable to previous research (Owen et al., 1987). Furthermore, process evaluation of the self-help print intervention revealed that over 81% (n = 185) of the intervention group reported receiving the ‘Active Living’ booklets in the mail, and over 70% (n = 161) reported they had read the booklets (see Section 6.5). These data represent good recognition and usage rates for this non-selective intervention method, which targeted a sample of

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* It should be noted, however, regardless of the effects the self-help print intervention itself had on self-reported physical activity levels over the study period some changes in physical activity may also have occurred due to other lifestyle factors, such as participants being ill or going on holidays etc. These uncontrollable causes of variation in individual physical activity routines may help to explain some of the changes shown by the control group over the study period, but should also be equally reported by the intervention group, thus allowing any added effects of the self-help print intervention to stand out.

† These data also provided adequate sample size to conduct comparisons between the intervention group participants who received (Treatment Received; TR) and received and read (Treatment Received & Read; TR&R) the self-help print intervention, rather than simply relying on Intention to Treat (ITT) analysis (see Section 5.9). The results of these analyses are discussed where relevant.
undifferentiated insufficiently active adults, with no apparent interest in physical activity.

The process evaluation data were collected by telephone interview at 4 to 6 weeks post baseline, where 97% of the intervention group participants were contacted (see Section 6.5). Whilst this telephone call was only intended as a data collection contact it may have been perceived by the participants as part of the intervention and/or may have prompted them to read and use the self-help print intervention booklets. However, it is difficult to speculate what effects it may have had. The only additional information on the potential intervention effects this extra telephone contact had on the intervention group participants is the fact the process evaluation questions were repeated at the 2-month follow-up. Consideration of the two sets of process evaluation data indicate that the process evaluation telephone call did not prompt the participants contacted to read or use the intervention materials after receiving the telephone call at 4- to 6-weeks. In fact, the proportion of the intervention group who recalled receiving and reading the intervention materials at 2-months was less than those who recalled receiving and reading the materials at 4- to 6-weeks. Therefore, whilst one cannot rule out the possible effects this telephone call had on the intervention groups participation in physical activity, we can suggest that it had no impact on the attention the participants gave to the self-help print intervention.

To determine whether the self-help print intervention was successful in promoting participation in physical activity specific hypotheses were established at the beginning of this thesis (see Section 1.5). The following Sections in this Chapter address each specific hypothesis in terms of the effectiveness of the self-help print intervention and compares the results with those found in previous research.

7.2 Changes in reported physical activity between baseline, 2 and 6-months

Hypothesis 1: After receiving the self-help print intervention in the mail the intervention group would; a. increase the time spent walking, b. increase the time spent participating in moderate physical activity, c. not change the time spent
participating in vigorous physical activity*, and d. increase total physical activity
time, per week between baseline and 2-months and baseline and 6-months, compared
to the control group whose activity levels would not significantly change.

a. **Time spent walking per week:** A significant group × time interaction was
observed for time spent walking per week for the pooled data. The intervention
group was significantly more likely to report a greater increase in walking time
per week between baseline and 2-months (+42-minutes per week), than the
control group (+12-minutes per week). The intervention group maintained a
21-minute per week increase in time spent walking per week at 6-months above
their baseline level. However, this difference was not significant (which was
also greater than the 5-minute increase maintained by the control group over
the same period). Therefore, the self-help print intervention was shown to be
effective in increasing the time spent walking per week in the intervention
group between baseline and 2-months, but the difference was not statistically
significant at the 6-month follow-up.

b. **Time spent doing moderate physical activity per week:** No significant
group × time interaction was observed for the pooled moderate physical
activity data. However, the intervention group reported a mean 48-minute per
week increase above their baseline level at 2-months compared to a 24-minute
increase reported by the control group. The reverse trend was observed
between baseline and 6-months, where the control group maintained a 17-
minute increase in moderate physical activity above their baseline level, but the
intervention group decreased their moderate physical activity level almost back
to their baseline level.

c. **Time spent doing vigorous physical activity per week:** No significant group
× time interaction was observed for the pooled vigorous physical activity data,
as both study groups reported a decrease in vigorous physical activity between
baseline and 2-months, and increased back towards the baseline level at 6-
months. Therefore, it would appear that the self-help print intervention had

* It is important to note that it was not one of the aims of the self-help print intervention
to promote vigorous intensity physical activity, unless the participant was already
regularly active at a moderate level.
little effect on changing participation in vigorous physical activity, which is in keeping with the proposed hypothesis.

d. **Total time spent doing physical activity per week:** A significant group × time interaction was observed for total time spent being physically active per week for the pooled data. The intervention group significantly increased their total time spent being physically active per week between baseline and 2-months (+84-minutes), where the control group did not. The difference between the baseline and 6-month total physical activity time reported by the intervention group was not significant despite the group maintaining a 20-minute per week increase above their baseline level compared to the control group who reported a 7-minute decrease in total physical activity over the same time period. Therefore, the self-help print intervention was shown to be effective in increasing the total time spent being physically active per week in the intervention group between baseline and 2-months, but its effectiveness was diminished by the 6-month follow-up.

Similar results were observed when the data were analysed by TR and TR&R. For that reason the differences in self-reported walking and total physical activity observed between the two study groups at the 2-month follow-up may be attributed to the fact that the intervention group were encouraged to participate in more physical activity by the self-help print intervention they received in the mail just after baseline. Furthermore, the intervention group participants seemed less likely to decrease their total physical activity at the 6-month follow-up compared to the control group. This may be due to the information provided in the self-help print intervention, which may have afforded the intervention group participants the necessary behavioural skills, required to help reduce the risk of relapse.

The results of the present trial were similar to previous research, which have demonstrated significant short-term improvements in physical activity (Marcus, Bock et al., 1998; Marcus, Emmons et al., 1997; Cardinal & Sachs, 1996; Marcus, Banspach et al., 1992). More specifically, the results of the present trial were slightly more positive than those reported by Marcus, Emmons et al. (1998), where there was no significant change in time spent exercising up to 3-months after the intervention was initiated. However they did report significant movement through
the Stages of Change. The increases in total reported physical activity in the present trial were evident within the intervention group regardless of stage movement.

Perhaps a more accurate comparison is with the community-based trial reported by Marcus, Bock et al. (1998), whereby a significant group × time interaction was observed between interventions based on stage-matched or standard self-help print materials to promote physical activity. Similar significant increases in reported physical activity were observed at 3-months in the previous trial as were found at 2-months in the present trial. However, unlike the present trial the Marcus Bock et al. (1998) trial reported further increases in reported physical activity up to 6-months, which may be due to the extra contacts made during the intervention phase. Marcus, Bock et al. (1998) tested multiple mailings of materials up to 3-months post baseline, compared with the single mailing of materials in the present trial. It should also be noted that the present trial was conducted prior to the results of the Marcus, Bock et al. (1998) being published, and that one of the main strengths of the Illawarra RCT remains unchallenged in that it is the only study to be based on a pro-actively recruited random sample selection of undifferentiated adults who had no apparent interest in physical activity. In light of these recent findings it appears that the initial success of the Illawarra RCT up to 2-months might potentially be enhanced up to 6-months with additional mail-based contact.

As mentioned previously (see Section 5.2), the Illawarra RCT started as the IPAP, a community-wide physical activity project, was finishing. Independent evaluation of the IPAP found no significant change in self-reported walking, moderate, vigorous or total physical activity levels after 2-years of localised mass media and supportive community interaction to promote physical activity to adults living in the Illawarra (IPAP, 1999). It is difficult to determine whether the nesting of the Illawarra RCT within the constructs of the broad-based IPAP had any effects on the outcomes of the present trial, but any such effects would equally apply to both the intervention and control group participants. However, it may be that the increased community awareness facilitated by the IPAP mass media campaign (IPAP, 1999) may be an antecedent to the actual behaviour change found in the present trial. Nonetheless, it appears that specifically targeting individuals with a self-help print intervention is more effective at promoting increases in self-reported physical activity than a non-
specific, multi-level project, albeit in the short-term (or in the least instance the self-help print intervention was an effective adjunctive to the broad-based IPAP mass media campaign).

Cumulative results from previous research have suggested 10% to 25% increases in physical activity can be expected in the short-term following cognitive behavioural intervention programs (Marcus & Forsyth, 1999), but that the effects are often short-lived once the intervention is removed (USDHHS, 1996; Dishman & Buckworth, 1996). The present trial is no exception in this regard, but one important factor must be acknowledged. Most of the previous research, which has used similar cognitive behavioural intervention programs to promote physical activity, has relied on volunteer participants (Marcus, Bock et al., 1998; Marcus, Emmons et al., 1997; Cardinal & Sachs, 1996; Marcus, Banspach et al., 1992) who may have enrolled in the projects with some pre-conceived idea of changing their behaviour. The findings of the present trial are noteworthy because they were observed in a non-volunteer, undifferentiated community sample. Furthermore, the significant increases in self-reported physical activity achieved in the present trial were facilitated using a more realistic approach to promoting physical activity (that could be readily adopted by organizations committed to promoting physical activity) as there is limited provider burden. Therefore, this study has greater relevance to public health in terms of the generalisability of findings and future physical activity promotion potential.

7.3 Proportions of the intervention and control groups meeting the 150-minute per week criterion of sufficient physical activity at baseline, 2 and 6-months

Hypothesis 2: After receiving the self-help print intervention in the mail, more of the intervention group participants' would be meeting a criterion of sufficient physical activity criterion, at least 150-minutes of physical activity per week than the control group at both the 2- and 6-month follow-ups.

There was a significant increase in the number of participants participating in at least 150-minutes of physical activity per week at both the 2- and 6-month follow-up within both study groups. However, a trend was established for more of the intervention group to meet the criterion at 2-months compared to the control group ($p = 0.06$). Therefore, these results indicate there may be some merit in providing the self-help print intervention to assist individuals to increase and maintain participation.
in physical activity in terms of meeting a criterion of sufficient physical activity per week over a 2-month period. Similar results were observed when the data were analysed by TR (see Table 6.25).

When the data were analysed by TR&R the intervention group participants were 1.64 times more likely be participating in at least 150-minutes of physical activity per week at 2-months compared with the control group (see Appendix M, Section M.3). This difference was not significant at 6-months despite the trend again being established for more intervention group participants to be meeting the criterion (see Table 6.23). Therefore, it would appear that the intervention group participants who actually reported receiving and reading the self-help print intervention were significantly more likely to increase their physical activity to at least 150-minutes per week than the control group participants at 2-months. Analysis by TR was also reported by Smith et al., (2000) where greater improvements were reported by the intervention group who reported receiving the intervention compared with the results from the ITT analysis.

Dunn, Marcus et al. (1997) reported that 78% of participants enrolled in a lifestyle physical activity promotion course met the 150-minute per week criterion 6-months post baseline (although a stricter definition of the criterion was applied to the data*). This result was slightly better than the results observed in the present trial, whereby 65% of the intervention group were meeting the criterion at 2-months and 62% at 6-months. However, it should also be noted that the present self-help print intervention was much less intensive (and less expensive to implement) than to the comprehensive intervention strategy applied by Dunn, Marcus et al. (1997) during Project Active. Project Active participants were asked to attend weekly meetings for the first 16-weeks of the project, then fortnightly meetings up to 24-weeks, followed by monthly meetings up to 1-year post-baseline. In addition to this Project Active was broadly based on the Stages of Change, and incorporated the same self-help manuals previously evaluated by Marcus, Emmons et al. (1998) and Marcus Bock et

* The definition of 150-minutes per week used by Dunn, Marcus et al. (1997) imposed a regularity factor on the data. Insomuch, physical activity had to be performed on most days of the week (i.e., in at least five, 30-minutes sessions).
Illawarra RCT: Summary

al. (1998). Project Active participants were also sent monthly Calenders of physical activity events and quarterly newsletters about the project (Dunn, Marcus et al., 1997). Overall, Project Active was quite intensive in comparison with the present trial, which only serves to reinforce the positive short-term effects generated from the population-based public health approach evaluated in the present trial.

Marcus, Bock et al. (1998) also examined the effectiveness of a mailed stage-based print intervention to encourage participants to meet the U.S Surgeon Generals criterion for physical activity up to 6-months. Again the intervention was slightly more intensive than the present trial, but it was successful in getting 43% of the inactive participants (staged in PC) at baseline to meet the criterion at 6 months. While the present results were analysed using the whole baseline sample, the results appear comparable.

7.4 Proportions of the intervention and control groups expending adequate amounts of energy from physical activity at baseline, 2 and 6-months

Hypothesis 3: After receiving the self-help print intervention in the mail, the intervention group would have significantly more participants expending adequate amounts of energy (>800kcal per week) through increased physical activity at the 2- and 6-month follow-ups, compared to the control group whose energy expenditure levels would not significantly increase.

Significant increases in the number of participants who were expending an adequate amount of energy from physical activity were observed in both study groups at both the 2- and 6-month follow-ups. However, a strong trend was established for more of the intervention group to be expending adequate amounts of energy from physical activity at 2-months compared to the control group ($p = 0.08$). Similar results were observed when the data were analysed by TR (see Table 6.25). However, when the data were analysed by TR&R the intervention group participants were 1.77 times more likely to be expending an adequate amount of energy from physical activity at 2-months than the control group (see Appendix M, Section M.4). This significant difference was not observed between the study groups at 6-months, but a favourable trend was suggested. Therefore, the intervention group participants who actually reported receiving and reading the self-help print intervention were shown to be
significantly more likely to increase their physical activity to a level consistent with adequate energy expenditure at 2-months.

A similar type of analysis was conducted in the independent IPAP evaluation, where non-significant increases in the proportion of independent samples meeting the adequate energy expenditure standard at baseline (59%) and 2-years later (62%; IPAP, 1999). The present trial reported a lower proportion of adequately active participants at baseline (38%) compared to previous estimates. Some of the adequately active participants at baseline had been removed from the sample, due to the exclusion of the participants who presented in the Maintenance stage during the preliminary surveys (see Section 5.2). It is also important to note that a similar proportion of the intervention group were categorised as adequately active as the original IPAP samples at both the 2- (59%) and 6-month (60%) follow-ups. Hence, the less active Illawarra RCT sample at baseline showed an increase in energy expenditure similar to the levels reported in a completely random sample of Illawarra residents, which included all active residents as well*. Furthermore, the differences between the intervention and control groups suggest that the self-help print intervention may have prompted this increase in the proportion of adequately active intervention group participants at 2-months.

Previous studies, have also used estimates of energy expenditure to evaluate the effectiveness of interventions. Cardinal & Sachs (1996) reported a significant change in MET estimates to demonstrate an intervention effect 1-month after delivering a written stage-based intervention through the internal network mail at a work-site. This sample was however, limited by consisting of only female volunteers and the short-term follow-up. Dunn, Garcia et al. (1998) estimated energy expenditure as kilocalories per day to demonstrate the effectiveness of Project Active over 6-months. However, the differences in energy expenditure observed between their two study groups was not significant at either 6-months (Dunn, Garcia et al., 1998) or 2-years (Dunn et al., 1999), despite significant increases in cardio-

* Remembering of course that the Illawarra RCT sample had some of the more active participants excluded based on their recurrent categorisation in the M stage of change prior to the initiation of the Illawarra trial (see Section 5.2).
respiratory fitness being reported. Regardless of these findings, the results of the present trial suggest a more realistic estimate of the potential of a mailed, self-help intervention to increase energy expenditure from physical activity.

7.5 Movement through the Stages of Change: Stage progression between baseline, 2- and 6-months

Hypothesis 4a: After receiving the self-help print intervention in the mail the intervention group would demonstrate significant stage progression (movement in a positive direction through the Stages of Change), between baseline and 2-months and baseline and 6-months, compared to the control group whose Stage of Change would remain relatively stable.

The number of participants categorised in each Stage of Change in the present trial were slightly different to previous Australian estimates defined by the same staging algorithm (Carnegie et al., submitted; Booth et al., 1993). The present sample tended to have more participants in PC, C and P, and fewer participants in A and M than the previous studies. This however, it not surprising since the different stage allocations may be explained by the fact that some of the M participants in the Illawarra RCT were excluded at baseline (see Section 5.2). Compared to U.S data (Marcus Emmons et al., 1998; Marcus & Owen, 1992) there were also slightly more participants in PC in the present sample (see Section 6.9). This could be explained by the fact that different instruments were used to categorise the Stages of Change or more importantly by the fact that the Illawarra RCT sample were not self-selected, as self-selecting samples tend not to attract people in PC. Therefore, given the participants in the Illawarra RCT were not volunteers, the proportions of participants in each Stage of Change in the present study may more accurately reflect real estimates of population physical activity Stage of Change distributions.

Both study groups were shown to have similar proportions of participants in each Stage of Change at baseline (see Section 6.9). Interestingly both study groups showed a decrease in the number of participants in the early Stages of Change (C and

As noted by Marcus, Banspach et al. (1992) when they designed intervention materials for participants in C, P and A Stages of Change and Long et al., 1996 who recruited only six PC participants to a physician based intervention study. This again highlights the importance of using non-volunteer participants to evaluate a physical activity promotion intervention.
P), as well as a slight decrease in the A Stage of Change. These decreases were balanced by an increase in the proportion of participants in the M Stage of Change at 2-months. These changes in proportions seem to indicate a linear progression of participants from the early stages (C, P, & A) to the M stage over the first 2 months of the study. However, it appears that there was no real effect on stage movement by the self-help print intervention. By the 6-month follow-up there was a slight decrease in the proportion of participants in both groups in the M stage compared to the 2-month proportions. However, the M stage was still higher at 6-months compared to the baseline proportion in both groups and higher in the intervention group compared to the control group. Furthermore, fewer intervention group participants were in the R stage at 6-months hinting that there may be some benefit of relapse prevention in the group that received the intervention materials.

There was little to no change in the proportions in the PC Stage of Change over the course of the study in either study group (see Section 6.9). Pre-contemplators are possibly the most difficult people to change. By definition they are not physically active and do not possess any intention to start being physically active (Marcus & Simkin, 1993). This group need to be made aware that a problem behaviour exists before they will even think about wanting to change. It would appear the self-help print intervention was not intensive or persuasive enough to effect a change in this sub group.

Overall it appears that the there was little difference between the two study groups in terms of basic stage movement over the course of the study. However, more fine-tuned analyses of the data demonstrated stronger intervention effects.

The intervention group participants were found to be 1.57 times more likely to report positive stage progression between baseline and 2-months compared to the control group (see Section 6.9.1). This result was replicated in the TR and TR&R analysis, but with slightly higher odds ratios being observed in the TR&R analysis (see Appendix M, Section M.5.1). Therefore, it would seem that the self-help print intervention was effective in assisting the intervention group to progress through the Stages of Change model towards a more active way of life, the effects of which were strengthened in those participants who reported they actually received and read the intervention materials.
Conversely, there was no significant difference between the study groups stage progression between baseline and 6-months in either the ITT and TR analysis. However, in the TR&R analysis the intervention group were shown to be 1.53 times more likely to report stage progression between baseline and 6-months compared to the control group (see Appendix M, Section M.5.1 and Table 6.26). This result further reinforces that the self-help print intervention was effective when it was recognised and read by the recipient.

Marcus, Banspach et al. (1992) have also observed positive stage progression following an intervention where 71% of participants in C, P and A at baseline reported progressing at least one stage by the 6-week follow-up. This is a slightly greater stage progression compared to 64% reported at 2-months by the intervention group in the present study, but was recorded over a shorter follow-up period. Also unlike the present trial, the previous study was limited by the lack of a control group. The results of the present study are comparable to the 58% of participants reporting stage progression after a worksite stage-based intervention conducted over 7-months (Cardinal & Sachs, 1996). Stage progression was also reported in another Australian study promoting physical activity through general practice (Bull et al., 1999), but again the stage progression rates reported at 1- and 6-months were smaller than those observed in the present trial.

Perhaps a more accurate comparison could be made between the present trial and the study conducted by Marcus, Emmons et al. (1998) where 37% of a group receiving stage matched intervention reported progressing at least one stage between baseline and a 3-month follow-up. Whilst the stage progression findings in the present study were greater, both studies reported positive stage progression in the control groups. This finding is important to recognise that some stage progression may have been due to external factors (other than the interventions themselves). The fact that both studies also reported significant changes in terms of stage progression in the intervention groups above their control conditions suggests the idea of a real intervention effect. Therefore, compared to previous research it would appear that the self-help print intervention used in the present study was more successful in promoting forward progression through the Stages of Change.
7.6 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 6-months

Hypothesis 4b: After receiving the self-help print intervention in the mail the intervention group would demonstrate significant categorical stage change from inactive stages (PC, C & P) to the active stages (A & M), compared to the control group whose categorical Stage of Change would remain relatively stable.

A significant number of the intervention group participants moved from the inactive stages (PC, C & P) to the more active stages (A & M) both between baseline and 2-months and between baseline and 6-months. Similar significant stage change was also observed in the control group between baseline and 2-months, but not between baseline and 6-months. Comparisons between groups revealed no significant difference in terms of movement from the inactive Stages of Change to the active Stages of Change between baseline and 2-months or between baseline and 6-months when analysed by ITT or TR (see Appendix K, Section K.1, K.2 and Appendix L, Section L.5.2). However, when data were analysed by TR&R (see Appendix M, Section M.5.2 and Table 6.25) a significant difference between the study groups was observed at 2-months.

This type of analysis has not been systematically reported in the literature, nonetheless, was considered an important evaluation of stage change from the inactive to active stages, particularly in terms of stage categorisation at 6-months. Six-months is an important factor of the stage of change model, as it defines the cut off point from which people move from A into M (Marcus & Simkin, 1993). From the results presented it appears that the self-help print intervention may have been an effective strategy to promote movement from the inactive stages to the active stages in the intervention group in the short-term, but not in the longer term.

7.7 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 6-months

Hypothesis 4c: After receiving the self-help print intervention in the mail the intervention group would demonstrate significant categorical stage change from the sedentary stages (PC & C) to the more active stages (P, A & M), compared to the control group whose categorical Stage of Change would remain relatively stable.
The intervention group showed a significant proportion of participants move from the sedentary stages to the more active Stages of Change between baseline and 2-months, where the control group did not. However, the difference between the two study groups was not quite significant when analysed by ITT (\( p = 0.07 \); see Appendix K, Section K.3), or TR (\( p = 0.06 \); see Appendix L, Section L.5.3). When analysed by TR&R the intervention group were 2.63 times more likely to show positive stage change from the sedentary stages (PC & C) to the more active stages (P, A & M) than the control group (see Appendix M, Section M.5.3) (see Appendix M, Section M.5.3). This highlights the importance of knowing that the intervention was received and used by the recipient.

The 6-month data again indicated that the intervention group (unlike the control group) reported significant movement from the sedentary Stages of Change to the active Stages of Change between baseline and 6-months. However, as before this did not translate in to a significant difference between the two study groups when analysed by ITT (\( p = 0.50 \); see Appendix K, Section K.4), TR (\( p = 0.19 \); see Appendix L, Section L.5.3) or TR&R (\( p = 0.15 \); see Appendix M, Section M.5.3).

Movement from the sedentary Stages of Change (PC & C) to trying to be more active (as in the P stage) is important for a previously sedentary person, especially someone in PC. Favourable trends were established in the present trial whereby, more of the intervention group participants who were categorised in the sedentary Stages of Change at baseline initiated some behaviour change by moving into the more active Stages of Change at both the 2- and 6-month follow-ups. Furthermore, these results were strengthened by the TR&R analysis, which further reinforces the role of the self-help print intervention materials when received and used as intended.
7.8 A comparison between the inadequately active intervention and control group participants at baseline who reported at least a 1-hour increase in total physical activity between baseline and 2-months

Hypothesis 5a: After receiving the self-help print intervention in the mail a significant proportion of inadequately active intervention group participants* at baseline would show at least a 1-hour increase in total physical activity per week between baseline and 2-months, compared to the inadequately active control group participants at baseline.

As with the stage change analysis this type of analysis has not been widely reported, but is important to be considered in light of the barriers some people experience when trying to find time to be physically active. For the majority of people a major barrier to participation in physical activity is a ‘lack of time’ (Zunft et al., 1999; Jaffee et al., 1999; Booth et al., 1997; Booth et al., 1995; Dishman et al., 1985). Consequently, the goal of participating in at least 1-hour more physical activity per week is a major step that should be recognised (Smith et al., 2000). These results are an extension of the results in the previous sections whereby only the changes in physical activity reported by the inadequately active participants at baseline were examined.

The inadequately active intervention group participants at baseline were 1.83 times more likely to increase their total physical activity by at least 1-hour at 2-months, compared to the inadequately active control group participants at baseline. This result was confirmed by logistic regression analysis (OR = 1.88, 95% CI = 1.13-3.13; see Section 6.10.1), after adjustment for other potential predictors of change (age, gender, marital status, language spoken at home, children living at home, employment status, education and baseline intention to be more active and baseline activity level). This finding reinforces the positive effects demonstrated by the whole intervention group in terms of actual reported physical activity changes between baseline and 2-months reported in Section 7.2. However, the importance of the current finding is that the analysis only included the inadequately active

* Inadequately active classified by inadequate energy expenditure (see Section 5.8.4.1), the inactive Stages of Change (see Section 5.8.6.2) or the sedentary Stages of Change (see Section 5.8.6.3).
participants at baseline, (the participants in most need of the intervention) and the fact the intervention was successful in promoting change in these participants is an important outcome. A previous intervention study based in general practice also reported a significant 1-hour increase in physical activity 6- to 10-weeks after baseline (OR = 1.59; 95% CI = 1.06-2.35; Smith et al., 2000). The significance of the present findings were slightly larger and recorded over a longer term. Nonetheless, a dose-response relationship has been observed. As the data were analysed by ITT, TR and TR&R (see Table 6.27) the odds ratio for group allocation became greater ranging from 1.88 in the ITT analysis to 2.16 in the TR&R analysis. This finding recognises the importance of acknowledging the receipt and use of the intervention materials.

The logistic regression analysis in the present study showed that education level was a significant predictor of the inadequately active baseline participants increasing their total physical activity by at least 1-hour between baseline and 2-months. Participants who reported <10 years formal education were 1.75 times more likely to report a 1-hour increase in total physical activity between baseline and 2-months. This finding is particularly important since higher education is consistently reported in determinants research as being a predictor of being adequately active (Booth et al., 1995; Owen & Bauman, 1992; Stephens et al., 1985; Folsom, Casperson et al., 1985). One might argue, that since those who are more educated are more likely to be active in the first place, the possibility of them being classified in the inadequately active group is less likely. Therefore, they would be under-represented in this analysis. This maybe the case, but the fact that the less educated participants in the present trial were motivated to become more active is indeed a positive finding. This finding is very important from a public health perspective, because low education level is often associated with lower levels of physical activity (Booth et al., 1997). The fact this intervention impacted upon the least educated proportion of the sample indicated that the intervention matched the needs of the community as it reached and influenced those most in need.

Education level was not a significant predictor in the TR (see Appendix L, Section L.6) or TR&R analysis (see Appendix M, Section M.6), which indicates that the self-help print intervention may not have been the major factor enforcing a positive
change in baseline physical activity level, or that sample size diminution may have precluded any effects being seen (see Table 6.27).

The 1-hour change data were also analysed using the Stages of Change to categorise participants either as inactive (PC, C & P; see Appendix K, Section K.1.1) or sedentary (PC & C; see Appendix K, Section K.3.1) at baseline. The results of the inactive stage (PC, C & P) sub-sample 1-hour change analyses were similar to the inadequate energy expenditure analysis. However, contrary to classification by inadequate energy expenditure or inactive Stage of Change the analysis by sedentary Stage of Change (PC & C) failed to support group allocation as a significant predictor of change between baseline and 2-months. The difference in these results may have been be caused by the small ‘n’ in the PC & C categorisation, which would effectively reduce the power to find a significant result. Another possibility is that the removal of the intrinsic motivation factor found in those participants in the P stage, which were excluded, from the sedentary Stage of Change sub-sample. Removal of the participants staged in P may have reduced the number of participants ready to increase their total physical activity by at least 1 hour.

Similar results were reported when the inactive and sedentary stage categories were analysed by TR and TR&R. Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants was again found to be group allocation (i.e., being in the intervention group), the odds of which increased as the analyses progressed from TR to TR&R (see Table 6.27).

In summary, participants reporting <10-years formal education were more likely to report an increase of at least 1-hour between baseline and 2-months in the ITT analysis, but not in the TR or TR&R analysis when the group was classified by inadequate energy expenditure. Group allocation (namely being in the intervention group) was repeatedly shown to be a significant predictor of increasing total physical activity by at least 1-hour between baseline and 2-months in the inadequately active baseline samples in the ITT analyses (whether classified by inadequate energy expenditure or inactive by Stage of Change) with the odds ratios ranging from 1.83 to 2.15. It also became apparent that participants who reported receiving and reading
the intervention materials were even more likely to report a positive change in their physical activity level indicating a dose-response relationship.

7.9 A comparison between the inadequately active intervention and control group participants at baseline who reported at least a 1-hour increase in total physical activity between baseline and 6-months

Hypothesis 5b: After receiving the self-help print intervention in the mail a significant proportion of inadequately active intervention group participants at baseline would show at least a 1-hour increase in total physical activity per week between baseline and 6-months, compared to the inadequately active control group participants at baseline.

These results are a continuation of the results discussed in the previous Section only the time frame for changing reported physical activity is between baseline and 6-months. There was no significant difference observed between the number of inadequately active intervention group participants at baseline and the number of their control counterparts who reported at least a 1-hour increase in physical activity between baseline and 6-months whether analysed by ITT (see Section 6.11.1) TR (see Appendix L, Section L.7.1) or TR&R (see Appendix M, Section M.7.1; also see Table 6.28).

However, as with the 2-month change results the ITT logistic regression analysis again revealed having <10-years education as a significant predictor of increasing total physical activity by at least 1-hour in the inadequately active participants at baseline between baseline and 6-months. This is particularly important for reasons discussed previously in Section 7.8. Other significant predictors were being male and reporting some intention to be more active within the next month or 6-months at baseline. The importance of being male as a significant predictor of change is not surprising, as Australian men have been shown to be more likely to be active than women (Booth al., 1995). Hence, men may be more receptive to information about increasing their level of physical activity. Similar determinants of adequate activity were found when a 150-minute per week criterion of sufficient activity was applied to a random sample of NSW residents, sampled in 1997, insomuch that respondents were more likely to be achieving the criterion if they were; male, spoke English at home and were tertiary educated (Lesjak & Bauman, 1998).
These results were also observed in the TR&R results but only partially replicated in the TR results (where education was not significant, see Table 6.28). Nonetheless, and important discovery here is this that group allocation was no longer a significant predictor of increasing total physical activity by at least 1-hour between baseline and 6-months in the inadequately active participants at baseline. This suggests the self-help print intervention was only effective in the short term, with the significant effects diminishing by 6-months. Unfortunately, due to the method and timing of the surveys we are unable to determine at what point in time the effectiveness of the intervention was reduced beyond usefulness between the 2- and 6-month follow-ups.

Similar results were observed when the baseline samples were stratified by inactive Stages of Change (PC, C & P; see Appendix L, Section L.7.2) or sedentary (PC & C; see Appendix M, Section M.7.2), where group allocation remained not significant. Once again being male, reporting <10-years education and reporting some intention to be more physically active at baseline were significant predictors of increasing total physical activity by at least a 1-hour between baseline and 6-months in the inactive stage participants at baseline (see Section 6.11.2). This result was replicated in the TR analysis (see Section 6.13.8.2) and TR&R results along with the addition of speaking English at home (see Section 6.14.8.2 and Table 6.28). Conversely when data were categorised by sedentary Stage of Change at baseline, education was removed as a significant predictor of change in the TR (see Section 6.11.3) and TR&R results (see Section 6.14.8.3), but retained in the ITT results (see Table 6.28).

In conclusion, it appeared that regardless of analytic strategy, group allocation (i.e., being in the intervention group) was a not a significant predictor of increasing total physical activity by at least 1-hour between baseline and 6-months in the inadequately active baseline samples (whether classified by inadequate energy expenditure or inactive/sedentary Stage of Change or when analysed by ITT, TR or TR&R). Interestingly, however, having <10-years education along with being male and reporting some intention to be more active at baseline all appeared to be significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inadequately active baseline participants. The only surprise here was education level, for reasons discussed previously. Nevertheless, the self-help print intervention was not found to be an effective method of increasing participation in total physical activity in the inadequately active sample at baseline in
the medium term (between baseline and 6-months), which supports the results presented in Section 7.2 where there was no change in reported physical activity between baseline and 6-months in either study group.

7.10 Maintenance of behaviour change between 2 and 6-months between the intervention and control groups

Hypothesis 6. After receiving the self-help print intervention in the mail more of the intervention group participants will report an initial 1-hour increase in total physical activity at 2-months will actually maintain that increase up to 6-months, as compared to the control group.

Despite the insignificant findings over the medium-term (up to 6-months) in the whole sample analysis discussed in Sections 7.2 and 7.9 there was a significant maintenance effect observed in the intervention group up to 6-months. A significant number of the intervention group participants who reported a 1-hour increase between baseline and 2-months maintained that 1-hour increase up the 6-month follow-up, compared to the control group ($p = 0.03$). This is an important finding in that it suggests that the participants for whom the self-help print intervention was successful in the short term (up to 2-months) may have also helped them to prevent relapse. Similar results were observed in the TR and TR&R analysis, which reinforces the ITT results (see Table 6.25).

This is an important finding, since evidence now suggests that changing community levels of physical activity may be as slow as trying to stop people smoking (Booth et al., 1995). Therefore, the major consequence of this finding points to the fact that community-wide approaches to behaviour change may first depend on changing the social norm with regard to physical activity behaviour. In this case changing peoples’ opinion on the importance of physical activity as an essential part of healthy living. It may be that this small but significant number of people who increased their physical activity in the Illawarra RCT and actually maintained that increase may inspire a flow on effect in the years to come as more and more people in society place greater importance on the value of being physically active.

7.11 Conclusions of the Illawarra RCT

The Illawarra RCT was designed to promote physical activity to a representative sample of adults aged between 40 and 60-years, living in a regional community.
setting. The focus of the study was to help sedentary people integrate physical activity into their daily lives. The self-help print intervention was designed and disseminated knowing that small increases in physical activity would make an important contribution to health (Arrol & Swinburn, 1994).

It is important to consider at this point that the Illawarra RCT was one of the first such studies to adopt a pro-active, community-wide sampling strategy and undifferentiated self-help intervention approach. Traditional community-based intervention studies aimed at promoting physical activity have relied on volunteer sample and have typically involved setting up and evaluating exercise programs such as walking groups (Hamdorf & Penhall, 1999; Ritchie et al., 1998; Lombard et al., 1995; Juneau et al., 1987) or more recently, intensive education programs like Project Active (Dunn, Garcia et al., 1998). Such programs are limited by the fact they usually attract individuals who would be classified as active prior to the intervention or in the least instance enroll in the program with the preconceived idea of wanting to change their behaviour. These types of programs are also prone to high drop out rates, as less active participants get lost in action orientated approach to behaviour change (see Section 2.7.3).

Other studies have evaluated home-based exercise programs, which are generally prescriptive in nature and administered in quasi community-based designs (King et al., 1992; King et al., 1988; Juneau et al., 1987; Gossard, Haskell et al., 1986). These types of programs have reported increased well-being among the participants (Jones & Owen, 1998) and are considered to be an effective means of targeting people who do not wish to be involved in structured external exercise programs (King et al., 1992). However, they are limited to volunteer participants wishing to seek assistance in changing their behaviour. Hence, the potential of such programs have limited public health impact on physical inactivity.

The self-help print intervention developed for the present study was designed to be broadly applicable to Australian adults so that it may be applied to whole communities. The intervention was founded on scientific evidence provided by previous trials. The intervention materials incorporated supportive behavioural strategies to assist recipients to firstly recognise the benefits of physical activity (see Chapter 3) and subsequently teach the behavioural skills necessary to integrate
physical activity into daily life. Therefore, the self-help print intervention not only had the potential to be widely accepted but also contained the scientific justification to have real impact in terms of population-based physical activity promotion.

The significant positive results observed in the intervention group at 2-months after receiving the intervention in the mail were generally supportive of the role the self-help print intervention may play in increasing self-reported physical activity levels in entire populations. The self-help print intervention was also shown be useful in supporting participants who had taken the first step to increase their total physical activity by at least 1-hour at 2-months, to actually maintain that increase up to 6-months. However, the long-term effectiveness of the present intervention strategy remains questionable for those participants who did not take action in the first 2-months. Furthermore, the impact the process evaluation telephone call conducted at 4- to 6-weeks had on the intervention participant’s reported physical activity levels could not be determined in this trial and should be considered when interpreting these results.

Notwithstanding, the initial success attributed to the self-help print intervention, the increases in self-reported physical activity observed at 2-months were clinically modest. However, as previously stated even these modest increases can be considered quite important from a public health perspective (Booth et al., 1995) and if these results were multiplied population-wide they could provide enormous benefit in reducing the costs associated with chronic lifestyle diseases (Stephenson et al., 2000).

Furthermore, the success of the self-help print intervention described here should be distinguished from similar self-help stage-based studies conducted previously in volunteer samples (Marcus, Bock et al., 1998; Marcus, Emmons et al., 1997; Marcus, Banspach et al., 1992). The present trial demonstrated similar significant increases in physical activity in the short-term in a sample of undifferentiated adults most of whom would not have planned to enrol in a physical activity promotion trial in the first place. Hence, these results are quite important because, most of the community dwelling adults are ignorant of the fact they have a problem health behaviour (being inactive).
The importance of physical activity has only recently been recognised as a public health concern. The prevalence of physical inactivity is about twice that of tobacco use (Bauman & Egger, 2000) and both health problems have substantial morbidity and mortality rates associated with them (Marcus & Forsyth, 1999), yet smoking cessation has received much more attention over the past few decades than physical inactivity, and subsequently is widely recognised as a concern in the general public and Government bodies (see Section 2.5). Whereas, physical inactivity is not yet widely accepted by individuals as a real threat to a healthy lifestyle. Hence, anyone randomly selected from the community and given information on how to become physically active may have been oblivious to the problem of physical inactivity and hence be more resistant than receptive to the behaviour changes suggested. It is therefore, likely that the population-based intervention strategy used in the present trial had to first overcome the lack of interest community members have with regard to physical activity and then try to encourage the inactive members of that community to do something about it. Consequently, these modest but significant results observed in the present study may be the most reasonable that could be expected in terms of an undifferentiated approach to physical activity promotion in a whole community.

The present study was limited by some of the usual difficulties associated with community-based research. For example, the self-reported measures used show substantial variability, but were not different to many other interventions using self-assessed physical activity outcomes (other limitations are discussed in Section 11.5). It is these complexities typical of community-based research which make replication studies important and for that reason it would by unwise to prematurely accept or deny the short and/or medium term effectiveness of the self-help print intervention demonstrated in the present trial based on the information presently available. Therefore, a replication of the Illawarra RCT was planned and conducted as part of this thesis using a larger population sample (including adults from a larger age spectrum), randomly selected from a State-wide population (see Section C of the thesis). It was anticipated that the replication study would allow more accurate and realistic conclusions to be drawn through the accumulation of results. Therefore, the next Section of this thesis (Section C) presents the replication study in terms of Methods, Results and a Summary Discussion, with an overall Summary and
Conclusions Chapter at the end. The overall Summary and Conclusions (see Chapter 11) will compare and contrast the effectiveness of the self-help print intervention as a regional or State-based physical activity promotion strategy taking into consideration the findings of the two independent population-based trials.
8. New South Wales Randomised Controlled Trial: Methods

The modest success of the Illawarra RCT required further investigation due to the usual difficulties involved in community-based research. Therefore, it was important to conduct a replication of the Illawarra RCT to gain a better understanding of the overall effectiveness of the self-help print intervention as a strategy to promote moderate physical activity to adults living in the community. The NSW RCT was, therefore, designed as replication of the Illawarra RCT and used similar participant recruitment methods, data collection strategies and the same self-help intervention materials and dissemination methods. The next three Chapters present the methods, results and discussion of the NSW RCT.

8.1 NSW RCT study design

Prior to data collection human research ethics approval was obtained for the study from the University of Wollongong Human Research Ethics Committee. Data management and evaluation were conducted according to the NH&MRC Statement on Human Experimentation (NH&MRC, 1994).

The NSW study was also a RCT, similar to the Illawarra RCT (see Section 5.1 and Figure 8.1). After baseline data were collected, consenting participants were also stratified by stage (see Section 5.8.5) and randomly allocated within stages using random data selection in SPSS® v 6.0 (SPSS, 1993) for Windows to either the:

1. intervention group, which included those participants allocated to receive the self-help print intervention (see Section 5.5), or the
2. control group, which included those participants who were allocated to not receive the intervention.
The two study groups were then followed-up at 2- and 8-months after baseline data were collected. It is important to note that process evaluation telephone call that was conducted 4- to 6-weeks after baseline in the Illawarra RCT was not conducted in the NSW RCT. Instead, the process evaluation of the self-help print intervention was conducted during the 2-month follow-up in the NSW RCT.

Where:

- $X_1$  Self-help print intervention mailed to intervention group 1-week after baseline
- $O_1$  Telephone follow-up survey with all participants 2-months after baseline
- $O_2$  Telephone follow-up survey with all participants 8-months after baseline

**Figure 8.1:** Schematic diagram of the NSW RCT study design

### 8.2 Sample selection for the NSW RCT

In November 1997, the NSW Health Department, conducted a random sample telephone survey, using accepted self-report measures of physical activity and Stage of Change to evaluate the recall of the ‘Active Australia’ mass media campaign (Bauman, Bellew et al., 1998b). The Hunter Valley Research Foundation was commissioned to conduct both sample selection and data collection, using a CATI program. The sampling method involved random sampling from the White Pages™ Electronic Telephone Directory, using the person aged between 18- and 75-years of age, whose birthday occurred next as the eligible respondent (HVRF, 1997b).
A total of 14,946 telephone calls* were conducted from 10\textsuperscript{th} November 1997 and 15\textsuperscript{th} December 1997 between the hours of 11am and 9.00pm Australian Eastern Standard Time, Monday to Friday, to collect a total of 2,009 completed interviews† ‡. This gave a response rate of 82% of all the eligible respondents contacted.

The sample interviewed was shown to be a true representation of the NSW population in terms of socio-demographic characteristics.§ (Bauman, Bellew et al., 1998b). From this sample 1,771 (88.2%) participants consented to being re-contacted. This consenting sub-sample was also shown to be not unlike the original random sample (Bauman, Bellew et al., 1998b). Thereafter, in March 1998 the Hunter Valley Research Foundation were again commissioned to re-contact a random sample of 1,200 respondents from the consenting 1,771 as a cohort follow-up for the NSW Health Department in March 1998. Complete follow-up data were obtained for 1,185 participants (67% of 1,771). Of the 1,185 subjects surveyed in March 1998, 1,108 consented to being re-contacted and/or receive some information in the mail. The names and addresses of this consenting sub-sample (n = 1,108) formed the basis of the NSW RCT sample evaluated in this thesis. Therefore, the

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* Most of the telephone calls recorded were multiple calls to the same household, with up to 6 ball backs attempted to contact the household of the eligible respondent. Additional telephone calls were made when the interviewers identified a contact time for the respondent.

† Weekend interviewing was also conducted and although it does not typically result in a high interview completion rate it does ensure a spread of contact times with each household, thereby, maximising the chance of contact. This was particularly important for households who were not contactable on week days or evenings (Hunter Valley Research Foundation, 1997).

‡ Other methods were also used to maximise response rates. These methods included the use of an answering machine strategy, where one of two scripted messages was left on the householders’ answering machine at various points of contact. The other method left a free call (1800) number on the answering machine to enabled householders to contact the survey supervisor directly. The use of the answering machine strategy combined with the free call number were thought to have significant influences in breaking through the answering machine barrier, thus converting soft refusals into completed interviews.

§ Compared to most recently available census data pertaining to the state of NSW.
March 1998 survey was both a cohort follow-up for the NSW Health Department*, and established a baseline for the present NSW RCT. A flow diagram representing NSW RCT sample selection process is presented in Figure 8.2.

* This cohort data set is beyond the scope of this thesis and is therefore, not presented. However, some of this cohort data was used to establish the M sample that were to be excluded from the study.
Prior to randomising for the NSW RCT 14 participants out of the 1,108 potential subjects were excluded due to; four moving interstate and chronic health problems that were considered to be contraindicated to physical activity promotion (four reported suffering from polio, three reported chronic heart conditions, and four reported other diseases). This left 1,094 participants which were to be included in the NSW RCT.

The 1,094 consenting participants data were stage analysed using the procedures described in Section 5.8.5 and matched to their November 1997 stage data. This enabled those participants who were in the M stage in November 1997 and in March 1998 (n = 378) to be excluded from the NSW RCT sample (as they were identified to be ineligible for the physical activity intervention since they had been shown to be regularly physically active at both data collection points and not in need of further motivation to either become or remain physically active; see Section 5.2).

Therefore, the NSW RCT sample included 719 participants. Participants were stratified by stage and randomly allocated into either an intervention or control group, using random data selection in SPSS® v 6.0 (SPSS, 1993). This method of randomisation ensured an even distribution of participants within each stage to each study group. The intervention group was, therefore, allocated 361 participants, and the control group allocated 358 subjects (see Figure 8.2).

The same estimates of the required sample size as were applied in the Illawarra RCT (see Section 5.2) were used in the NSW RCT. For the present trial however, using a standardised difference of 0.20 and \( p = 0.05 \), having \( >350 \) participants in each group would give the study over 80% power to detect an intervention effect.

### 8.3 NSW RCT survey instrument

As the NSW RCT sample was selected from a sample who participated in a previous physical activity survey conducted by the NSW Health Department in November 1997, the same physical activity recall questions were used throughout data collection for this thesis. Consistent with Illawarra RCT additional questions were inserted into the 2-month survey to evaluate the self-help print intervention (see Section 5.3.3). Therefore, this section describes the questions used in the NSW RCT in terms of origin, validity and reliability and highlights any differences between this
study and Study 1. A complete copy of the baseline NSW RCT Survey is presented in Appendix O.

All participant data were treated with upmost confidentiality and anonymity was assured. The sequence in which the questions were asked remained the same throughout all the follow-up surveys reported in this thesis because question order may affect the responses given. However, in the multiple component questions relating to a similar topic, the order of the items was randomly rotated to reduce the influence of an ordering effect.

8.3.1 Demographic measures

In November 1997, the NSW Health Department collected the following demographic variables: gender, age, marital status, weight, height, children living at home under 18 and under 5, highest level of education, occupation, language usually spoken at home, and postcode. These demographic questions were standard questions used by NSW Health Department in their annual State Health Surveys. As with the Illawarra RCT these questions were not asked again in the NSW RCT, because age could be predicted, residential address was confirmed at the end of the baseline survey. The other demographic factors were not expected to have significantly changed in the previous 3-months and due to the random nature of the study, changes would be evenly distributed between the two study groups. However, the question regarding the participants' weight was re-evaluated during the 8-month follow-up as it may have changed over the period of time.

8.3.2 Physical activity measures

The 2-week physical activity recall questions used in the Illawarra RCT were replaced with 1-week physical activity recall questions, because the National Physical Activity Measurement Committee (Australian Institute of Health and Welfare, AIHW) decided to change the recall period to be in line with other International questionnaires to allow more accurate comparisons to be made between data-sets. These 1-week recall questions were shown to have acceptable reliability by Bauman, Bellew et al. (1998a) who reported high correlations between the total time spent participating in vigorous (r = 0.89) and moderate intensity physical activity (r = 0.97). The authors also reported comparable test-
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retest intra-class correlation coefficients for both vigorous (ICC = 0.72) and moderate physical activity (ICC = 0.52; Bauman, Bellew et al., 1998a). Therefore, these questions were considered suitable to evaluate physical activity participation in the NSW RCT.

8.3.3 Intervention evaluation measures

The same intervention process evaluation questions as were used in the Illawarra RCT surveys were used in the NSW RCT survey (see Section 5.3.3).

8.3.4 Background media influences during the NSW RCT

Consistent with the Illawarra RCT ‘other’ factors, which may have influenced the study participants’ physical activity, were monitored. A similar global media question was asked to determine whether any mass media or background information might have influenced participants throughout the study period. An open-ended message recall question followed to determine the types of messages being recalled by the participants at each follow-up. The types of messages recalled in the open ended question were content analysed and close coded into recall of specific exercise campaign messages, general physical activity messages and other health messages.

8.4 Survey methods used in the NSW RCT

The Hunter Valley Research Foundation was commissioned to conduct all the follow-up surveys for the NSW RCT.

8.4.1 Baseline survey methods

NSW RCT baseline data were collected by the Hunter Valley Research Foundation using methods similar to those reported in the Illawarra RCT (see Section 5.4.1 and Section 8.2). Data were collected from 719 participants between the 12th and 27th of March, 1998. Also consistent with the Illawarra RCT participants who participated in this survey were asked if they were willing to be recontacted in the future to participate in a similar survey and/or receive some written materials in the mail. This served as the consenting process to become involved in the NSW RCT.
8.4.2 The 2-month follow-up survey methods

The Hunter Valley Research Foundation conducted the 2-month follow-up survey between the 25th of May and 15th of June, 1998. The same survey instrument and contact methods as were used during the baseline data collection were used again in the 2-month follow-up. In addition process evaluation questions regarding the self-help print intervention were included.

As with the baseline survey a minimum of six call backs were attempted to contact the named participant with up to 16 call backs made where a participant was confirmed to be at the residence but unavailable at the time the call was made. Also consistent with the baseline survey participants were asked if they were willing to participate in a similar survey in the future. This served as the consenting process to be re-contacted in approximately 4-months.

8.4.3 The 8-month follow-up survey methods

The planned 6-month follow-up was extended to 8-months to allow for the change of season to spring and daylight saving, ensuring the baseline and 8-month data were collected during similar climatic conditions. Therefore, the Hunter Valley Research Foundation conducted the 8-month survey between the 2nd and 19th of November, 1998. The same survey instrument and contact methods as were used during the 2-month survey were used again in the 8-month follow-up. However, the respondents self-reported weight question was re-inserted as the response to the question may have changed since baseline data were collected. A minimum of three call backs were attempted to contact the named participant with up to 12 call backs made where a participant was confirmed to be at the residence but unavailable at the time the call was made.

8.5 Implementation of the self-help print intervention

The same self-help print intervention materials and method of dissemination that were used in the Illawarra RCT were again used in this study (see Section 5.5). Therefore, each intervention group participant was sent a personally addressed letter detailing how to use the enclosed self-help print intervention according to his or her individual stage of change (see Appendix I). The self-help print intervention was sent out approximately 1-week after receiving the baseline data.
8.5.1 Process evaluation of the self-help print intervention

The process evaluation telephone call conducted in the Illawarra RCT intervention group participants (see Section 5.5.1) was not conducted in the NSW RCT. This telephone call was eliminated from the NSW RCT for three main reasons;

1. For the self-help print intervention to be easily disseminable it needed to be as simple as possible to implement for agencies interested in adopting. It was unlikely that such agencies would have a person to follow-up each person who receives the self-help print materials by telephone. Therefore, the follow-up telephone call was not considered viable in terms of the time and administration costs involved.

2. The effect the process evaluation call had on the recall and use of the self-help print intervention as evaluated at 2-months in the Illawarra RCT was minimal (see Section 6.5.1).

3. The timing of the NSW RCT in terms of seasonality and survey potential were reduced. Therefore, it was more practical for the process evaluation of the self-help intervention to be included in the 2-month follow-up.

8.6 Data management and quality control

As with the baseline and 2-month Illawarra RCT data, the Hunter Valley Research Foundation converted the CATI response data to Dbase 4 file format and provided it in electronic format to the author of this thesis. After the data were received it was transferred into SPSS® v6.0 for Windows (SPSS, 1993), where it was thoroughly cleaned and crosschecked. The original data files were kept as a back up to the working file.

At baseline each participant was assigned an identification number, which was subsequently used to match their baseline data with the 2- and 8-month follow-up data to enable paired statistics to be conducted. Participant’s names and addresses were not kept with the research data to ensure anonymity and confidentiality of the data. When the follow-up data sets were merged, each participant’s identification number was crosschecked with their date of birth and gender. Any discrepancies in
date of birth or gender were then double cross-checked with the participant’s details in the original data set.

8.7 Characteristics of the NSW RCT study sample

8.7.1 Representativeness of the NSW RCT study sample

To ensure the study sample selected and contacted for each trial represented the population from which it was drawn, comparisons were made. The original sample of 2,009, and the consenting sub sample were reported to be representative of the NSW population in terms of socio-demographic characteristics (Bauman, Bellew et al., 1998; see Section 8.2).

8.7.2 NSW RCT follow-up response rates

Loss of participants in follow-up studies is a methodological concern (see Section 5.6.1). Therefore, response rates were calculated for each follow-up survey. Analysis of participants data lost to follow-up was monitored to determine whether those participants differed systematically from those who were retained in the sample (see Section 9.2).

8.7.3 Comparability of the NSW RCT study groups

To ensure comparability between the two randomly selected study groups, comparability checks were conducted between the intervention and control groups at baseline, 2- and 8-months. Variables used to compare the groups included the baseline demographics and physical activity prevalence rates (see Section 9.3).

8.8 Data preparation

As with the Illawarra RCT, data collected during the follow-up surveys in the NSW RCT were used to determine whether the self-help print intervention had an effect on participants self-reported physical activity participation. Data analyses were conducted in SPSS® v6.0 for Windows (SPSS, 1993), and Epi-info 6.04 (Epi-info, 1997), using the same variety of data preparation strategies as were used in the Illawarra RCT (see Section 5.8). The broad topics of data analysis included preparation and analysis of the;

1. Socio-demographic data
2. Physical activity participation levels
3. Criterion of sufficient physical activity per week
4. Energy expenditure analysis
   a. Adequately or inadequately active
5. Movement through the Stages of Change.
   a. Stage progression analysis.
   b. Movement through the Stages of Change from the inactive stages (PC, C & P) to active stages (A&M).
   c. Movement through the Stages of Change from the sedentary stages (PC & C) to active stages (P, A & M).
6. Assessing change in physical activity participation adjusted to baseline level
   a. Inadequately active but motivated to change- sub group analysis.

8.9 Data analysis

Similar data analysis strategies as were used in the Illawarra RCT were again used in the NSW RCT including the Intention to Treat, Treatment Received and Treatment Received and Read analysis (as described previously in Section 5.9).

Additionally in the NSW RCT, separate sub-group analysis of those participants in the same age bracket as those in the Illawarra RCT were conducted (that is those participants aged over 40 years of age).

Therefore, the same key outcomes as were analysed in the Illawarra RCT were determined for the NSW RCT, as listed below.

1. **Change in total physical activity minutes per week** (walking, moderate and vigorous physical activity and total activity per week) between baseline, 2- and 8-months.

2. **Proportion meeting a criterion of sufficient physical activity per week**, based on the proportion of participants who achieved the recommended level of 150-minutes of physical activity per week. at baseline, 2- and 8-month.

3. **Adequate energy expenditure** categorised by the proportion of participants who reach the recommended energy expenditure level (800 kcal per week) between baseline, 2- and 8-months.
4. **Movement through the Stages of Change**

   a. **Stage progression** (movement in a positive direction through the Stages of Change) between baseline, 2- and 8-months.

   b. **Categorical stage change** from inactive stages (PC, C & P) to active stages (A & M), between baseline, 2- and 8-months.

   c. **Categorical stage change** from sedentary stages (PC & C) to active stages (P, A & M), between baseline, 2- and 8-months.

5. **Assessing change in physical activity participation adjusted for baseline level** based on proportions of participants who showed at least a 1-hour increase in physical activity prevalence (walking, moderate or vigorous physical activity and total physical activity) between baseline, 2- and 8-months, categorised by adequate energy expenditure.

   a. **Inadequately active- sub group analysis** based on the number of participants classified as inadequately active (i.e., those participants classified as inadequately active by energy expenditure, inactive stage (PC, C and P) or sedentary stage (PC & C) who showed at least a 1-hour increase in physical activity prevalence (walking, moderate and vigorous physical activity as well as total physical activity) between baseline, 2- and 8-months.

8.10 **Statistical analysis**

Again bivariate and multivariate statistical analyses were conducted on group effects using SPSS® v6.0 for Windows (SPSS, 1993). The same statistical methods as were used in the Illawarra RCT were also used in the NSW RCT. Therefore, again to avoid repetition see Section 5.10 for a more complete description of the statistical methods.
9. New South Wales Randomised Controlled Trial: Results

9.1 Characteristics of the NSW RCT study sample

To ensure that the NSW RCT sample was representative of the State-wide population, comparison with the original data set was conducted. The original randomly selected NSW Health sample (n = 2,009) from which the NSW RCT sample was selected had already been shown to reasonably represent the NSW State-wide population (Bauman et al., 1998b).

The consenting sub-sample of the original NSW Health sample who were followed-up in March 1998 (n = 1,185) were similar in terms of social and physical demographics as well as reported physical activity levels to the original randomly selected NSW Health sample (see Appendix P, Table P.1 and Table P.2). Thereafter, the NSW RCT sample (n = 719) were also shown to be similar to the original NSW Health sample, except that there were slightly fewer males in the NSW RCT sample (see Appendix P, Table P.1) and there was a significant decrease in reported physical activity in the NSW RCT sample (see Appendix P, Table P.2). However, this is not surprising since the participants who were in Maintenance in both surveys were removed form the NSW RCT sample (see Section 8.2), to focus the intervention upon those who were insufficiently active.

9.2 NSW RCT follow-up response rates

As many as 4,807 telephone calls were made during the baseline survey in March 1998, to contact a sample of 1,200 participants on behalf of the NSW Health Department (see Section 8.2). Completed interviews were obtained from 1,185 participants, which formed the basis of the present State-wide NSW RCT.

Up to 2,342 telephone calls were made during the 2-month follow-up (May 1998) in an attempt to contact the 719 participants (361 intervention and 358 control participants).

Completed interviews were obtained from 669 participants, giving a follow-up response rate of 97%. Of the 669 participants re-contacted, 646 (97%) consented to be
recontacted for the 8-month follow-up. A total of 1,697 telephone calls were made during the 8-month follow-up (November 1998) in an attempt to contact the 646 remaining participants. Completed interviews were obtained from 622 participants, giving a follow-up response rate of 96%. The reasons for non-response from the three surveys are presented in Table 9.1.

Table 9.1: Total NSW sample response rates for the baseline, 2 and 8-month follow-ups

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete interview</td>
<td>1450*</td>
<td>719#</td>
<td>646</td>
</tr>
<tr>
<td>Refused interview</td>
<td>59</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Household refused interview</td>
<td>8</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Disconnected phone/moved</td>
<td>44</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Unavailable for interview period</td>
<td>75</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Unsuitable</td>
<td>5</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Terminated interview</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No contact made</td>
<td>68</td>
<td>11</td>
<td>-</td>
</tr>
</tbody>
</table>

* 1,450 participants were randomly selected to re-contact at least 1,200 respondents for the NSW Health Department and establish a baseline for the present NSW RCT.

# 719 participants were enrolled in the NSW RCT after excluding participants with contra-indications to physical activity promotion and those who were regularly physically active (see Section 8.2).

9.3 Comparability of the NSW RCT study groups

As reported in Section 8.1, the NSW RCT sample (n = 719) was randomly divided into one of two groups, the intervention or control group. Each of the two study groups’ baseline demographic and physical activity data was compared to ensure that the two groups were similar. There were no significant differences between the two groups socio-demographic data (see Table 9.2).
Table 9.2: Socio-demographic characteristics of the NSW RCT intervention and control groups

<table>
<thead>
<tr>
<th>Social demographics</th>
<th>intervention group n = 361 (%)</th>
<th>control group n = 358 (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>35.0</td>
<td>38.0</td>
<td>0.61</td>
</tr>
<tr>
<td>female</td>
<td>65.0</td>
<td>62.0</td>
<td>(0.43)</td>
</tr>
<tr>
<td>marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>married/defacto</td>
<td>77.3</td>
<td>74.6</td>
<td>0.58</td>
</tr>
<tr>
<td>single/widow</td>
<td>22.7</td>
<td>25.4</td>
<td>(0.45)</td>
</tr>
<tr>
<td>children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>23.3</td>
<td>21.5</td>
<td>0.23</td>
</tr>
<tr>
<td>no</td>
<td>76.7</td>
<td>78.5</td>
<td>(0.63)</td>
</tr>
<tr>
<td>education level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10 years</td>
<td>38.4</td>
<td>35.6</td>
<td>0.49</td>
</tr>
<tr>
<td>≥ 10 years</td>
<td>61.6</td>
<td>64.4</td>
<td>(0.49)</td>
</tr>
<tr>
<td>occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>manager/professional</td>
<td>35.2</td>
<td>36.5</td>
<td>6.63</td>
</tr>
<tr>
<td>trades person</td>
<td>7.6</td>
<td>9.6</td>
<td>(0.76)</td>
</tr>
<tr>
<td>clerk</td>
<td>12.0</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>sales &amp; personal service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>machine operator/labourer</td>
<td>11.8</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>No occupation</td>
<td>24.5</td>
<td>28.0</td>
<td></td>
</tr>
<tr>
<td>main language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>95.8</td>
<td>96.0</td>
<td>0.00</td>
</tr>
<tr>
<td>other</td>
<td>4.2</td>
<td>4.0</td>
<td>(1.00)</td>
</tr>
</tbody>
</table>

Includes students, unemployed and retired participants.

There were also no significant differences between the intervention and control groups in terms of mean age, height, mass and BMI at baseline (see Table 9.3).

Table 9.3: Physical demographic comparisons between the intervention and control groups at baseline

<table>
<thead>
<tr>
<th></th>
<th>intervention group n = 361 (mean ± SD)</th>
<th>control group n = 358 (mean ± SD)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (yrs)</td>
<td>43.0 ± 9.3</td>
<td>42.9 ± 9.3</td>
<td>-0.12</td>
<td>0.90</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.69 ± 0.13</td>
<td>0.74</td>
<td>0.46</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>73.0 ± 16.6</td>
<td>71.4 ± 15.5</td>
<td>-1.36</td>
<td>0.12</td>
</tr>
<tr>
<td>BMI (kg/m$^2$)</td>
<td>25.7 ± 5.0</td>
<td>25.1 ± 5.3</td>
<td>-1.58</td>
<td>0.12</td>
</tr>
</tbody>
</table>
There were no significant differences between the study groups walking, moderate or total physical activity prevalence at baseline (see Table 9.4). There was, however, a significant difference in time spent doing vigorous intensity physical activity, with the control group participating in approximately 11-minutes a week more that the intervention group.

Table 9.4: Average weekly walking, moderate, vigorous and total physical activity time reported by the intervention and control groups at baseline

<table>
<thead>
<tr>
<th>physical activity</th>
<th>intervention group n = 361 (mean ± SD)</th>
<th>control group n = 358 (mean ± SD)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>1.45 ± 2.13</td>
<td>1.51 ± 2.12</td>
<td>0.40</td>
<td>0.69</td>
</tr>
<tr>
<td>moderate</td>
<td>0.41 ± 1.31</td>
<td>0.27 ± 0.85</td>
<td>-1.72</td>
<td>0.09</td>
</tr>
<tr>
<td>vigorous</td>
<td>0.30 ± 0.77</td>
<td>0.49 ± 1.5</td>
<td>2.08</td>
<td>0.04*</td>
</tr>
<tr>
<td>total activity</td>
<td>2.17 ± 2.64</td>
<td>2.28 ± 2.72</td>
<td>0.55</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Despite 23 control participants and 27 intervention participants being lost to follow-up after the 2-month survey the two study groups remained similar in terms of reported age, height and mass and estimated BMI (see Table 9.5).

Table 9.5: Physical demographic comparisons between the intervention and control groups at 2-months

<table>
<thead>
<tr>
<th></th>
<th>intervention group n = 335 (mean ± SD)</th>
<th>control group n = 334 (mean ± SD)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (yrs)</td>
<td>43.0 ± 9.2</td>
<td>43.0 ± 9.3</td>
<td>-0.01</td>
<td>0.99</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.69 ± 0.13</td>
<td>0.63</td>
<td>0.53</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>73.0 ± 16.6</td>
<td>71.2 ± 15.5</td>
<td>-1.45</td>
<td>0.12</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.7 ± 4.9</td>
<td>25.0 ± 5.2</td>
<td>-1.63</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Despite an additional 20 control and 27 intervention participants being lost to follow-up during the 8-month survey the two study groups remained similar in terms of age and height. However, there was a significant difference between the groups reported mass and estimated BMI ($p = 0.05$; see Table 9.6).
Table 9.6: Physical demographic comparisons between the intervention and control groups at 8-months

<table>
<thead>
<tr>
<th></th>
<th>intervention group</th>
<th>control group</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (yrs)</td>
<td>43.3 ± 9.0</td>
<td>43.0 ± 9.3</td>
<td>-0.43</td>
<td>0.67</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.69 ± 0.13</td>
<td>0.31</td>
<td>0.76</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>73.4 ± 16.8</td>
<td>70.8 ± 15.3</td>
<td>-1.96</td>
<td>0.05</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.7 ± 4.9</td>
<td>24.9 ± 5.1</td>
<td>-2.00</td>
<td>0.05</td>
</tr>
</tbody>
</table>

9.4 Background media influences on the NSW RCT study groups

Despite the control group recalling more health related media at all three data collection points there was no statistically significant difference between the intervention and control groups recall prevalence of health messages at baseline ($X^2 (1, n = 719) = 1.06$, $p = 0.30$), 2 ($X^2 (1, n = 669) = 0.90$, $p = 0.34$), or 8-month ($X^2 (1, n = 622) = 0.25$, $p = 0.61$) follow-ups (see Figure 9.1). There was, however, a statistically significant decrease in message recall between baseline and 2-months ($X^2 (1, n = 669) = 36.81$, $p < 0.001$), and baseline and 8-months ($X^2 (1, n = 622) = 53.38$, $p < 0.001$), regardless of group allocation.

Figure 9.1: Proportions of the intervention and control groups who recalled a health message at baseline, 2 and 8-months
Furthermore, there were no significant differences between the number of intervention and control group participants who recalled specific physical activity related messages at; baseline (41% versus 42%; \( p = 0.97 \)) 2-months (19% versus 15%; \( p = 0.30 \)), or 8-months (17% versus 19%; \( p = 0.50 \)). Both study groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation as such these data are presented in Appendix P.2.

### 9.5 Process evaluation of the self-help print intervention

Process evaluation of the self-help print intervention at 2-months revealed 129 (39%) participants recalled receiving the materials unprompted. A further 124 (37%) participants recalled the materials after a verbal prompt. An additional 81 (24%) participants did not recall receiving the booklets at all. Therefore, 253* of the 334 participants contacted at 2-months recalled receiving the self-help print intervention in the mail, resulting in a recognition rate of 76%. Of the 253 participants recalling the booklets, 83% (n = 210†) reported that they read the booklet they were directed to, (which represents 63% of this population based intervention group who were supposed to receive the self-help print intervention).

A total of 23% of participants recalling the booklets said they had discussed them with someone else. Another 53% reported they had kept booklets and knew where they were, and 21% reported that they had kept booklets but were not able to recall where they had put them. The remaining participants either had thrown the booklets out (14%), had given them to someone else to read (5%), or could not recall what they had done with them (6%).

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* \( n = 253 \) are the participants to be included in the Treatment Received analysis reported in Appendix S.

† \( n = 210 \) are the participants to be included in the Treatment Received and Read analysis reported in Appendix T.
9.6 Changes in reported physical activity between baseline, 2 and 8-months

The results presented in this section include data from all participants involved in the study from baseline. Consistent with the Intention to Treat (ITT) analysis described in Section 5.9, participants who were lost to follow-up during the 2 and 8-month surveys, were substituted the group mean data for the physical activity prevalence data. Therefore, 361 intervention and 358 control group participants' physical activity data were analysed.

9.6.1 Changes in walking participation reported by the intervention and control groups at baseline, 2 and 8-months

As was stated in Section 9.3 there was no significant difference between the intervention and control groups’ baseline walking prevalence ($p = 0.82$).

The control group decreased their walking prevalence between baseline and 2-months, while the intervention group reported an increase in time spent walking (see Figure 9.2). The difference between the groups, however, was not statistically significant ($F (1, n = 719) = 0.25, p = 0.62$). There was no significant effect of time across the three data collection points when the data were pooled across groups ($F (1, n = 719) = 0.53, p = 0.59$), hence there was no group×time interaction either ($F (1, n = 719) = 0.78, p = 0.46$).

However, a trend did exist for the intervention group to increase their time spent walking after receiving the self-help intervention between the baseline and 2-months (see Figure 9.2). Despite the non-significant results, it is also interesting to note that the increase in walking prevalence reported by the intervention group at 2-months decreased back towards their baseline level by the 8-month follow-up. Whereas, the control group, who reported a decrease in walking prevalence between baseline and 2-months, reported an increase at the 8-month follow-up. However, these changes were not significantly different to the intervention group.
9.6.2 Changes in moderate physical activity participation reported by the intervention and control groups at baseline, 2 and 8-months

There was no significant difference between the intervention and control groups’ baseline moderate intensity physical activity prevalence, despite the intervention group showing a slightly higher prevalence at baseline ($p = 0.10$; see Section 9.3 and Figure 9.3).

The intervention group decreased their time spent participating in moderate intensity physical activity between the baseline and 2-months. The control group participation in moderate physical activity remained relatively stable over the same 2-month period. Despite this difference there was no statistically significant group difference ($F (1, n = 719) = 0.87, p = 0.35$). There was also no significant effect of time when the data were pooled across groups ($F (1, n = 719) = 0.57, p = 0.57$) or group$x$time interaction ($F (1, n = 719) = 1.05, p = 0.35$). Therefore, it would seem that the self-help print intervention had little to no effect on the intervention group participants reported moderate intensity physical activity levels.
9.6.3 Changes in vigorous physical activity participation reported by the intervention and control groups at baseline, 2 and 8-months

There was a significant difference between the intervention and control group’s baseline vigorous intensity physical activity prevalence ($t = 2.08; p = 0.04$; see Section 9.3 and Figure 9.4), with the control group reporting significantly more vigorous activity at baseline.

The intervention group reported an 8-minute per week increase in vigorous intensity physical activity between baseline and 2-months and a further increase of 3-minutes per week at the 8-month follow-up. The control group, however, showed a decreases in vigorous intensity physical activity between baseline and 2-months, but an increase beyond their baseline level at the 8-month follow-up. Despite the difference in trends between the two groups there was no statistically significant group differences observed ($F (1, n = 719) = 1.43, p = 0.23$). There was, however, a significant effect of time demonstrated when the data were pooled across groups ($F (1, n = 719) = 3.00, p = 0.05$; between baseline and 8-months $t = -2.17, p = 0.03$) but
no statistically significant group × time interaction \( F(1, n = 719) = 2.08, p = 0.13 \). Therefore, it would seem that the intervention group made positive changes to their vigorous intensity physical activity levels over the 8-month study period, but the fact their baseline level was significantly different from the control groups may have masked the intervention effect at 2-months.

Figure 9.4: Average vigorous physical activity time (hours per week ± standard deviation) reported by the intervention \( n = 361 \) and control \( n = 358 \) groups at baseline, 2 and 8-months

9.6.4 Changes in total physical activity participation reported by the intervention and control groups at baseline, 2 and 8-months

There was no significant difference between the intervention and control group total physical activity prevalence at baseline, despite the intervention group showing a slightly lower prevalence \( (p = 0.76) \) (see Section 9.3 and Figure 9.6).

The intervention group reported an increase in total physical activity time between baseline and 2-months, which was maintained at the 8-month follow-up. The control group initially reported a decrease in total physical activity prevalence between baseline and 2-months, but reported an increase beyond their baseline levels at the 8-month follow-up. Again despite the obvious differences between the
two groups at each data collection point the effect was not statistically significant (F (1, n = 719) = 0.20, p = 0.65). There was no statistically significant effect of time when the data were pooled across groups (F (1, n = 719) = 0.97, p = 0.38) or group × time interaction (F (1, n = 719) = 0.65, p = 0.52) observed.

![Graph showing average total physical activity time](image)

Figure 9.5: Average total physical activity time (hours per week ± standard deviation) reported by the intervention (n = 361) and control (n = 358) groups at baseline, 2 and 8-months

9.7 Proportions of the intervention and control groups meeting a 150-minute per week criterion of sufficient physical activity at baseline, 2 and 8-months

Results reported in this section compare the proportion of the intervention and control groups' that reported sufficient physical activity to meet the 150-minute per week criterion for physical activity at baseline, 2- and 8-months (see Section 5.8.3).

There was no significant difference between the intervention and control group at baseline in terms of the proportion of participants in each group participating in less than 150-minutes of physical activity per week at baseline (Yates Corrected $\chi^2$ (1, n = 719) = 0.007, $p = 0.93$; see Table 9.7). There were also no statistically significant changes within either study group in relation to the proportion of participants reaching the 150-minute criterion at 2-months (intervention; McNemars $\chi^2$ (1, n = 361) = 2.02, $p$...
= 0.16: control group; McNemar's \( \chi^2 \) (1, \( n = 358 \)) = 2.37, \( p=0.12 \). Hence, there was also no significant difference between groups (Yates Corrected \( \chi^2 \) (1, \( n = 719 \)) = 0.00, \( p=1.00 \)).

**Table 9.7:** Proportion of the intervention and control groups participating in at least 150-minutes of physical activity per week at baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>( \geq 150)-minutes</th>
<th>(&lt; 150)-minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group ( n = 361 )</td>
<td></td>
<td>54 (15)</td>
<td>72 (20)</td>
</tr>
<tr>
<td><strong>control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group ( n = 358 )</td>
<td></td>
<td>57 (16)</td>
<td>70 (20)</td>
</tr>
</tbody>
</table>

Similar results were observed at the 8-month follow-up with no statistically significant changes observed within either study group (intervention group McNemar's \( \chi^2 \) (1, \( n = 361 \)) = 1.87, \( p = 0.17 \); control group McNemar's \( \chi^2 \) (1, \( n = 358 \)) = 0.86, \( p = 0.36 \)). However, slightly more control group participants were meeting the criterion at 8-months (see Table 9.8), but this difference was not significant from the intervention group (Yates Corrected \( \chi^2 \) (1, \( n = 719 \)) = 3.11, \( p = 0.58 \)).

**Table 9.8:** Proportion of the intervention and control groups participating in at least 150-minutes of physical activity per week at baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>( \geq 150)-minutes</th>
<th>(&lt; 150)-minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group ( n = 361 )</td>
<td></td>
<td>49 (14)</td>
<td>77 (21)</td>
</tr>
<tr>
<td><strong>control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group ( n = 358 )</td>
<td></td>
<td>63 (18)</td>
<td>64 (18)</td>
</tr>
</tbody>
</table>

### 9.8 Proportion of the intervention and control groups expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

Results reported in this Section compare the proportion of the intervention and control groups’ that expended adequate amounts of energy from physical activity at baseline, 2- and 8-months (see Section 5.8.4).
At baseline the both study groups’ reported similar proportions of participants in each energy expenditure category (see Table 9.9). Specifically there were equal proportions observed in each group in terms of adequate and inadequate energy expenditure categories (see Section 5.8.4.1), where the intervention group reported 27% of participants in the adequate category and the control group reported 28%.

Table 9.9: Changes in energy expenditure categories in the intervention and control groups between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>energy expenditure category</th>
<th>intervention group n = 361</th>
<th>control group n = 358</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>baseline 2-month 8-month</td>
<td>baseline 2-month 8-month</td>
</tr>
<tr>
<td>high</td>
<td>18 (5) 25 (7) 33 (9)</td>
<td>27 (8) 20 (6) 34 (10)</td>
</tr>
<tr>
<td>moderate</td>
<td>80 (22) 82 (23) 90 (25)</td>
<td>70 (20) 84 (24) 101 (28)</td>
</tr>
<tr>
<td>low</td>
<td>184 (51) 192 (53) 188 (52)</td>
<td>193 (54) 193 (54) 165 (46)</td>
</tr>
<tr>
<td>sedentary</td>
<td>79 (22) 62 (17) 50 (15)</td>
<td>68 (19) 61 (17) 58 (16)</td>
</tr>
</tbody>
</table>

Similar results were also reported at the 2-month follow-up where the intervention and control groups reported 30% of each group in the adequate energy expenditure category (also see Table 9.9). Further examination of the 2-month data within each study group showed that a non-significant trend for participants who were classified as inadequately active at baseline to become adequately active by 2-months (intervention McNemars $X^2 (1, n = 361) = 0.50, p = 0.48$ and control group McNemars $X^2 (1, n = 358) = 0.30, p = 0.58$; see Table 9.10). Hence there was no significant difference between groups (Yates Corrected $X^2 (1, n = 719) = 0.13, p = 0.72$).

Table 9.10: Changes in adequate and inadequate energy expenditure categories in the intervention and control groups between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>adequate</th>
<th>inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 361</td>
<td>inadequate</td>
<td>68 (19)</td>
<td>195 (54)</td>
</tr>
<tr>
<td></td>
<td>adequate</td>
<td>39 (11)</td>
<td>59 (16)</td>
</tr>
<tr>
<td>control group n = 358</td>
<td>inadequate</td>
<td>63 (18)</td>
<td>198 (55)</td>
</tr>
<tr>
<td></td>
<td>adequate</td>
<td>41 (11)</td>
<td>56 (15)</td>
</tr>
</tbody>
</table>
By the 8-month follow-up the 38% of the control group participants were expending adequate amounts of energy from physical activity compared to only 34% of the intervention group (see Table 9.9). Despite the 4% difference observed between groups the difference was not statistically significant ($X^2 (1, n = 719) = 0.88, p = 0.35$; see Table 9.9).

Further examination of the 8-month energy expenditure change data showed a significant number of intervention group participants moved from the inadequate to adequate activity category (McNemar's $X^2 (1, n = 361) = 3.87, p = 0.05$). However, the control group also reported a significant number of participants moved from the inadequately active category to the adequate activity category at 8-months (McNemar's $X^2 (1, n = 358) = 11.80, p = 0.001$; see Table 9.10). However, there was no significant difference between the two study groups (Yates Corrected $X^2 (1, n = 719) = 0.62, p = 0.43$).

<table>
<thead>
<tr>
<th>Table 9.11: Changes in adequate and inadequate energy expenditure categories in the intervention and control groups between baseline and 8-months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td><strong>Intervention group</strong></td>
</tr>
<tr>
<td>inadequate</td>
</tr>
<tr>
<td>adequate</td>
</tr>
<tr>
<td><strong>Control group</strong></td>
</tr>
<tr>
<td>inadequate</td>
</tr>
<tr>
<td>adequate</td>
</tr>
</tbody>
</table>

### 9.9 Movement through the Stages of Change

The results in this Section describe only those participants who were successfully followed up at all three data collection points (see Section 9.2). Therefore, data from 307 intervention and 315 control group participants were analysed. Nonetheless, baseline stage distribution was very similar between the groups. Specifically there were 68% in the early inactive stages (PC, C & P), and 27% in the more active stages (A & M) within both the intervention and control groups (see Table 9.12).
Table 9.12: Stage distribution within the intervention and control groups at baseline

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>intervention group n = 307</th>
<th>control group n = 315</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>PC</td>
<td>52 (17)</td>
<td>57 (18)</td>
</tr>
<tr>
<td>C</td>
<td>78 (25)</td>
<td>78 (25)</td>
</tr>
<tr>
<td>P</td>
<td>79 (26)</td>
<td>80 (25)</td>
</tr>
<tr>
<td>A</td>
<td>35 (11)</td>
<td>36 (11)</td>
</tr>
<tr>
<td>M</td>
<td>50 (16)</td>
<td>51 (16)</td>
</tr>
<tr>
<td>R</td>
<td>13 (4)</td>
<td>13 (4)</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation, C = Contemplation, P = Preparation, A = Action & M = Maintenance.

By the 2-month follow-up there was a slight decrease in the number of participants in P in the intervention group (see Figure 9.6). This movement out of the P stage was counterbalanced by an increase in the C and M stages (see Appendix Q, Table Q.17). Similar stage movement out of the P stage was observed in the control group up to 2-months (see Figure 9.7 and Appendix Q, Table Q.18). There was also a decrease in the number of participants in the A stage in both study groups at 2-months compared to the baseline proportions. Most participants who were in the A stage at baseline moved into the M stage at 2-months (see Appendix Q Tables Q.17, and Q.18). However, there was some backward movement out of the A stage also observed in both study groups. A notable decrease in the C stage was seen in the control group at 2-months, most of who moved forward in to the P stage. This change in the C stage was not seen in the intervention group at 2-months.
At the 8-month follow-up both study groups showed a slight increase in the proportion of participants in the P stages. More notable, however, was the continued increase in the M stage between 2- and 8-months (see Figures 9.6 and 9.7). Most of this stage shifting was from the C and P stage in both groups and also the A stage in the control group (see Appendix Q, Tables Q.17 and Q.18). The R stages decreased between 2- and 8-months in the control group but remained relatively stable in intervention group.
The proportion of participants in the PC stage remained similar with slight fluctuations in both groups over the course of the study. More fine tuned analyses of these data are presented in Sections 9.9.1, 9.9.2, and 9.9.3.

9.9.1 Progression through the Stages of Change between baseline, 2 and 8-months

Data only from the participants followed up at 2-months were included in this analysis. There were no significant differences between the number of participants in each study group progressing at least one stage between baseline and 2-months ($X^2 (1, n = 669) = 0.01, p = 0.98; OR = 1.02, 95\%CI = 0.74-1.40$; see Table 9.13).

Table 9.13: A comparison between the intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 334</td>
<td>136 (41)</td>
<td>198 (59)</td>
</tr>
<tr>
<td>control group n = 335</td>
<td>135 (40)</td>
<td>200 (60)</td>
</tr>
</tbody>
</table>

Data only from the participants followed up at 8-months were included in this analysis. As with the 2-month data there were no significant differences between the number of participants in each study group progressing at least one stage between baseline and 8-months ($X^2 (1, n = 622) = 0.44, p = 0.51; OR = 0.89, 95\%CI = 0.64-1.23$; see Table 9.14).

Table 9.14: A comparison between the intervention and control group participants who progressed at least one stage between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 307</td>
<td>140 (46)</td>
<td>167 (54)</td>
</tr>
<tr>
<td>control group n = 315</td>
<td>153 (49)</td>
<td>162 (51)</td>
</tr>
</tbody>
</table>

9.9.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months

Movement through the Stages of Change from the inactive (PC, C & P) stages to active (A & M) stages are reported in Appendix Q and a summary presented here.

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There was no significant difference observed between the two study groups inactive staged participants at baseline who moved into the active stages between baseline and 2-months (Yates Corrected $\chi^2 (1, n = 441) = 0.00, p = 0.98$; OR = 0.98, 95% CI = 0.61-1.56; see Appendix Q, Section Q.1).

As with the 2-month follow up there was no significant difference observed between the number of inactive staged participants at baseline in each study group who moved into the active stages between baseline and 8-months (Yates Corrected $\chi^2 (1, n = 415) = 2.52, p = 0.11$; see Appendix Q, Section Q.2).

9.9.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months

The alternate method of analysing stage change used to analyse stage change from the sedentary stages (PC & C) to the somewhat active states (P, A & M) stages was also conducted on the NSW RCT data. However, due to the similarity in results obtained the main results are presented in Appendix Q, and a summary presented here.

There was no significant difference observed between the two study groups sedentary staged participants at baseline who moved into the active stages between baseline and 2-months (Yates Corrected $\chi^2 (1, n = 279) = 0.11, p = 0.94$; see Appendix Q, Section Q.3).

Again there was no significant difference observed between the two study groups sedentary staged participants at baseline who moved into the active stages between baseline and 8-months (Yates Corrected $\chi^2 (1, n = 258) = 3.07, p = 0.08$; see Appendix Q, Section Q.4).

9.10 Changes in reported physical activity at 2-months adjusted for baseline physical activity level

The results presented in this Section was based on individual participants change in reported physical activity at 2-months compared to their baseline levels. Firstly any amount of change was determined for the intervention and control groups across all three physical activity states (walking, moderate intensity and vigorous intensity...
physical activity), then total physical activity change was analysed. Both the intervention and control group participants showed similar proportions report increases their physical activity prevalence (across all physical activity categories) between the baseline the 2-month follow-up (see Table 9.15).

Table 9.15: A comparison between the intervention and control group participants who increased their reported physical activity level between baseline and 2-months

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Intervention Group n = 361 n (%)</th>
<th>Control Group n = 358 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased activity</td>
<td>Remained Stable</td>
</tr>
<tr>
<td>Walking</td>
<td>168 (46)</td>
<td>131 (46)</td>
</tr>
<tr>
<td>Moderate</td>
<td>58 (16)</td>
<td>65 (18)</td>
</tr>
<tr>
<td>Vigorous</td>
<td>82 (23)</td>
<td>54 (15)</td>
</tr>
<tr>
<td>Total</td>
<td>174 (48)</td>
<td>147 (41)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by any amount
# reported physical activity stayed the same
§ reported physical activity decreased by any amount

Further analysis of the physical activity change data examined the difference between the intervention and control group participants' who actually increased their physical activity by at least 1-hour or more between baseline and 2-months (see Table 9.16).

Table 9.16: Comparison between intervention and control groups who increased their physical activity by at least 1-hour increase between baseline and 2-months

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Intervention Group n = 334 n (%)</th>
<th>Control Group n = 335 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Increased 1-hour</td>
<td>Within 1-hour</td>
</tr>
<tr>
<td>Walking</td>
<td>89 (25)</td>
<td>193 (54)</td>
</tr>
<tr>
<td>Moderate</td>
<td>27 (8)</td>
<td>296 (82)</td>
</tr>
<tr>
<td>Vigorous</td>
<td>39 (11)</td>
<td>296 (82)</td>
</tr>
<tr>
<td>Total</td>
<td>112 (31)</td>
<td>150 (42)</td>
</tr>
</tbody>
</table>

* reported at least a 1-hour increase in physical activity
# reported physical activity remained within 1-hour
§ reported at least a 1-hour decrease in physical activity

Again these data indicate that similar proportions of both groups' demonstrated at least a 1-hour increase in each physical activity category. Hence, no significant differences
were observed between the two study groups' \( \chi^2 (1, n = 719) = 0.17, p = 0.68; \text{OR} = 1.08, 95\% \text{CI} = 0.78-1.51 \).

9.10.1 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

Based on the data presented in Section 9.9.1 and Table 9.12, over 31% and 29% of the intervention and control groups respectively increased their total physical activity prevalence by at least 1-hour between the baseline and 2-month follow-up. This section examined the changes associated with the two study groups' adequately and inadequately active participants at baseline who increase their total physical activity by at least 1-hour.

The intervention groups inadequately active participants at baseline were no more likely to increase their total physical activity level by at least 1-hour between baseline and 2-months compared to the adequately active participants at baseline (McNemars \( \chi^2 (1, n = 361) = 0.93, p = 0.34 \)). Similar results were observed in the control group (McNemars \( \chi^2 (1, n = 358) = 0.28, p = 0.60 \); see Table 9.17).

**Table 9.17: A comparison between intervention and control groups adequately and inadequately active baseline participants who increased their total physical activity by at least 1-hour between baseline and 2-months**

<table>
<thead>
<tr>
<th>groups classified by energy expenditure category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>98 (27)</td>
<td>14 (4)</td>
<td>84 (24)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>263 (73)</td>
<td>98 (27)</td>
<td>165 (46)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>97 (27)</td>
<td>13 (4)</td>
<td>84 (24)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>261 (73)</td>
<td>92 (26)</td>
<td>169 (47)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by < 1-hour, remained the same or decreased by any amount

Nonetheless, the number of intervention and control groups inadequately active participants to increase their baseline total physical activity by at least 1-hour were
compared. Chi square analysis revealed no statistically significant difference between the inadequately active intervention and control groups ($\chi^2(1, n = 485) = 0.15, p = 0.70$; OR = 1.09, 95% CI = 0.75-1.58; see Table 9.18).

Table 9.18: A comparison of the inadequately active baseline intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months

<table>
<thead>
<tr>
<th>inadequately Active</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>263 (73)</td>
<td>98 (27)</td>
<td>165 (46)</td>
</tr>
<tr>
<td>control group</td>
<td>261 (73)</td>
<td>92 (26)</td>
<td>169 (47)</td>
</tr>
</tbody>
</table>

In order to determine any other significant predictors of change backward logistic regression using only the data from the inadequately active baseline sample was conducted. All variables except for baseline intention to be active, education level, marital status and baseline activity status were removed via the backward elimination method (Model Fit; $X^2 = 27.44, p < 0.001$ (-2 log likelihood = 639.5). The model also retained marital status, baseline intention, education level and baseline activity status but not all were individually significant predictors.

The only significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline were; i. being single (OR = 3.45, 95% CI = 1.10-2.63), ii. baseline activity status <20-minutes per week (OR = 2.44, 95% CI = 1.52-3.85) compared to baseline activity ≥80-minutes per week, iii. baseline intention to be more active within the next 6-months.

* Variables coded into dichotomous values and entered into the model as follows, group allocation (intervention or control group), gender (male and female), marital status (those married or in a defacto relationship and those single or widowed), language (those who speak English at home and other languages), age (<50 years and >50 years), children living at home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded trichotomously were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), BMI (underweight, normal weight, overweight and obese), baseline activity status (≤20 minutes per week, 20 to 80 minutes per week and >80 minutes per week).
month (OR = 1.83, 95% CI = 1.14-2.92). The other variables retained in the model (education, intention to be more active in the next 6-months and a baseline activity level ≥20 to 80-minutes per week) were not independently significant predictors of change (see Table 9.19).

Table 9.19: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inadequately active baseline sample classified by energy expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>marital status (single)</td>
<td>-0.52</td>
<td>0.22</td>
<td>0.01</td>
<td>0.59 (0.38-0.91)</td>
</tr>
<tr>
<td>marital status (couple)</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.38</td>
<td>0.20</td>
<td>0.06</td>
<td>0.69 (0.46-1.01)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>intention (none)</td>
<td>0.60</td>
<td>0.24</td>
<td>0.01</td>
<td>1.83 (1.14-2.92)</td>
</tr>
<tr>
<td>intention (next month)</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>intention (next 6 months)</td>
<td>0.27</td>
<td>0.24</td>
<td>0.26</td>
<td>1.31 (0.80-2.14)</td>
</tr>
<tr>
<td>baseline activity (&lt; 20 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min /wk)</td>
<td>-0.40</td>
<td>0.23</td>
<td>0.07</td>
<td>0.67 (0.43-1.05)</td>
</tr>
<tr>
<td>baseline activity (≥ 80 min /wk)</td>
<td>-0.88</td>
<td>0.24</td>
<td>0.00</td>
<td>0.42 (0.26-0.66)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender (p = 0.7); language (p = 0.7); age (p = 0.9); BMI (p = 0.9); child at home (p = 0.6); employment status (p = 0.5); group allocation (p = 0.9).

9.10.2 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change

This Section describes the results of the 1-hour change data between baseline and 2-months as categorised by those people classified as inactive by the stage change analysis described in Section 9.9.2, but as before the complete results are presented in Appendix Q, Section Q.1.1, and a summary presented here.

There was no significant between the two study groups in terms of the number of inactive staged participants at baseline who reported an increase in their total activity
status of at least 1-hour between baseline and 2-months (OR = 1.04, 95% CI = 0.71-1.53; see Appendix Q, Table Q.3).

Logistic regression analysis revealed that significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline were; i. reporting some intention to be more active within the next month at baseline (OR = 2.15, 95% CI = 1.28-3.56), ii. being single (OR = 1.61, 95% CI = 1.03-2.56), iii. having <10-years education (OR = 1.49, 95% CI = 1.01-2.22), iv. having a baseline activity level <20-minutes (OR = 2.63, 95% CI = 1.56-4.17, compared to baseline activity ≥80-minutes per week). Other variables retained the model were not independently significant (see Appendix Q, Table Q.4).

9.10.3 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

This Section describes the results of the 1-hour change data between baseline and 2-months as categorised by those people classified as sedentary by the stage change analysis described in Section 9.9.3, but as before the complete results are presented in Appendix Q, Section Q.3.1, and a summary presented here.

There was no significant between the two study groups in terms of the number of sedentary staged participants at baseline who reported an increase in their total activity level of at least 1-hour between baseline and 2-months (OR = 1.04, 95% CI = 0.63-1.71; see Appendix Q, Table Q.11).

The only significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline indicated by logistic regression was education level <10-years (OR = 2.17, 95% CI = 1.28-3.57). Baseline intention within the next month was not independently significant (see Appendix Q, Table Q.8)
9.11 Changes in reported physical activity at 8-months adjusted for baseline physical activity level

These results are based on the same principles applied in Section 9.9, however, the final data collection point of 8-months was substituted for the 2-month data. Note that only those participants with 8-month follow-up data were included. Individual activity states, walking, moderate, and vigorous physical activity, as well as total physical activity prevalence were compared.

It was apparent that intervention group had a greater percentage of participants increase their time spent walking and doing vigorous intensity physical activity between baseline and 8-months. Whereas, the control group showed a greater proportion of participants increasing their moderate intensity physical activity time over the same time period compared to the intervention group. These results culminated in 5% more of the intervention group increasing their total physical activity time between baseline and 8-months compared to the control group (see Table 9.20).

Table 9.20: A comparison between the intervention and control group participants who increased their reported physical activity level between baseline and 8-months

<table>
<thead>
<tr>
<th>physical activity</th>
<th>intervention group n =307 n (%)</th>
<th>control group n =315 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>increased activity</td>
<td>remained stable</td>
</tr>
<tr>
<td>walking</td>
<td>182 (50)</td>
<td>128 (36)</td>
</tr>
<tr>
<td>moderate</td>
<td>73 (20)</td>
<td>71 (20)</td>
</tr>
<tr>
<td>vigorous</td>
<td>125 (35)</td>
<td>60 (17)</td>
</tr>
<tr>
<td>total</td>
<td>186 (52)</td>
<td>148 (41)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by any amount
# reported physical activity stayed the same
§ reported physical activity decreased by any amount

Further analysis of the 8-month activity change data, examined the difference between the intervention and control group participants who increased their activity status by at least 1-hour or more over 8-months. These data indicated more of the intervention group (39%) increased their total physical activity by at least 1-hour or more, than the control group (32%; see Table 9.21). However, despite the 7% difference between
groups it was not a significant result (Yates Corrected $\chi^2 (1, n = 719) = 3.21, p = 0.07; OR = 1.34, 95% CI = 0.97-1.84).

Table 9.21: A comparison between intervention and control groups who increased their physical activity by at least 1-hour increase between baseline and 8-months

<table>
<thead>
<tr>
<th>physical activity</th>
<th>intervention group n = 307 n (%)</th>
<th>control group n = 315 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>increased 1-hour*</td>
<td>within 1-hour#</td>
</tr>
<tr>
<td>walking</td>
<td>114 (32)</td>
<td>169 (47)</td>
</tr>
<tr>
<td>moderate</td>
<td>21 (6)</td>
<td>301 (83)</td>
</tr>
<tr>
<td>vigorous</td>
<td>49 (14)</td>
<td>276 (77)</td>
</tr>
<tr>
<td>total</td>
<td>139 (39)</td>
<td>124 (34)</td>
</tr>
</tbody>
</table>

* reported at least a 1-hour increase in physical activity
# reported physical activity remained within 1-hour
§ reported at least a 1-hour decrease in physical activity

9.11.1 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

Further analysis of the data presented in Section 9.9.2. and Table 9.17 examined the difference between the intervention and control group participants who were classified as adequately or inadequately active at baseline and increased their total physical activity by at least 1-hour over the 8-month period.

The intervention groups inadequately active participants at baseline were significantly more likely to increase their total physical activity level by at least 1-hour between baseline and 8-months compared to the adequately active participants at baseline (McNemars $\chi^2 (1, n = 361) = 7.44, p < 0.01$). This result however, was not observed in the control group (McNemars $\chi^2 (1, n = 358) = 1.45, p = 0.23$; see Table 9.22).
Table 9.22: A comparison between intervention and control groups’ adequately and inadequately active baseline participants who increased their total physical activity by at least 1-hour between baseline and 8-months

<table>
<thead>
<tr>
<th>groups classified by energy expenditure category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 8-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>98 (27)</td>
<td>11 (3)</td>
<td>87 (24)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>263 (73)</td>
<td>128 (36)</td>
<td>135 (37)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>97 (27)</td>
<td>17 (5)</td>
<td>80 (22)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>261 (73)</td>
<td>97 (27)</td>
<td>164 (46)</td>
</tr>
</tbody>
</table>

* Other = reported physical activity increased by < 1-hour, remained the same or decreased by any amount

Further analysis between the intervention and control groups’ inadequately active samples at baseline was conducted. Chi square analysis of the data revealed that the inadequately active intervention group participants at baseline were 1.60 times more likely (95% CI = 1.11-2.31) to increase their total activity status by at least 1-hour at 8-months compared to the inadequately active control groups participants at baseline ($\chi^2$ (1, n = 524) = 6.62, $p = 0.01$; see Table 9.23).

Table 9.23: A comparison of the inadequately active baseline intervention and control participants who increased their total physical activity by at least 1-hour between baseline and 8-months

<table>
<thead>
<tr>
<th>inadequately Active</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 8-months n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>263 (73)</td>
<td>128 (36)</td>
<td>135 (37)</td>
</tr>
<tr>
<td>control group</td>
<td>261 (73)</td>
<td>97 (27)</td>
<td>164 (46)</td>
</tr>
</tbody>
</table>

* Other = reported physical activity increased by < 1-hour, remained the same or decreased by any amount

In order to determine any other significant predictors of change backward logistic regression using only the data from the inadequately active baseline sample was conducted. The model retained group allocation, baseline intention, language spoken at home and baseline activity level but not all were individually significantly
predictors (Model Fit; \( \chi^2 = 60.48, p < 0.001 \) (-2 log likelihood = 636.3)). The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inadequately active participants at baseline were: i. being in the intervention group (OR = 1.59, 95% CI = 1.09-2.30), ii. baseline activity level <20-minutes per week (OR = 4.55, 95% CI = 2.70-7.14) compared to baseline activity ≥80-minutes per week, iii. baseline intention to be more active within the next month (OR = 1.92, 95% CI = 1.21-3.10). The other variables retained in the model (language spoken at home, intention to be more active in the next 6-months and a baseline activity level ≥20 to 80-minutes per week) were not independently significant predictors of change (see Table 9.24).

Table 9.24: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the inadequately active baseline sample classified by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>-</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>group allocation (intervention)</td>
<td>0.46</td>
<td>0.19</td>
<td>0.01</td>
<td>1.58 (1.09-2.30)</td>
</tr>
<tr>
<td>intention (none)</td>
<td>-</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.65</td>
<td>0.24</td>
<td>0.01</td>
<td>1.92 (1.21-3.10)</td>
</tr>
<tr>
<td>intention (next 6 months)</td>
<td>0.19</td>
<td>0.24</td>
<td>0.43</td>
<td>1.20 (0.76-1.94)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>-</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>language (English)</td>
<td>1.13</td>
<td>0.58</td>
<td>0.05</td>
<td>3.08 (0.99-9.65)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 mins/wk)</td>
<td>-</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min /wk)</td>
<td>-0.42</td>
<td>0.23</td>
<td>0.06</td>
<td>0.66 (0.42-1.03)</td>
</tr>
<tr>
<td>baseline activity (≥ 80 min /wk)</td>
<td>-1.48</td>
<td>0.25</td>
<td>0.00</td>
<td>0.22 (0.14-0.37)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (\( p = 0.2 \)); language (\( p = 0.6 \)); age (\( p = 0.9 \)); employment status (\( p = 0.9 \)); child at home (\( p = 0.2 \)); BMI (\( p = 0.9 \)); marital status (\( p = 0.9 \)); education (\( p = 0.4 \));
9.11.2 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by inactive Stages of Change

This Section describes the results of the 1-hour change data between baseline and 8-months as categorised by those people classified as inactive by the stage change analysis described in Section 9.9.2, but as before the complete results are presented in Appendix Q, Section Q.2.1, and a summary presented here.

The inactive staged intervention group participants at baseline were 1.64 times more likely to report a 1-hour increase in their total physical activity between baseline and 8-months than the control group (95% CI = 1.13-2.40; see Appendix Q, Table Q.7). This result was also confirmed by logistic regression, whereby, significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the inactive staged participants at baseline were; i. being in the intervention group (OR = 1.97, 95% CI = 1.13-2.46), ii. having some intention to be more active within the next month at baseline (OR = 2.03, 95% CI = 1.22-3.39), and iii. reporting a baseline activity level <20-minutes per week (OR = 4.34, 95% CI = 2.63-7.14) compared to baseline activity ≥80-minutes per week. Other variables retained in the model were not independently significant (see Appendix Q, Table Q.8).

9.11.3 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by sedentary Stages of Change

This Section describes the results of the 1-hour change data between baseline and 8-months as categorised by those people classified as sedentary by the stage change analysis described in Section 9.9.3, but as before the complete results are presented in Appendix Q, Section Q.4.1, and a summary presented here.

The inactive staged intervention group participants at baseline were 1.99 times more likely to report a 1-hour increase in their total physical activity between baseline and 8-months than the control group (95% CI = 1.22-3.25; see Appendix Q, Table Q.15). This result was also confirmed by logistic regression, whereby, significant
predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the sedentary staged participants at baseline were; i. being in the intervention group (OR = 1.93, 95% CI = 1.19-3.16), and ii. reporting a baseline activity level <15-minutes per week (OR = 2.77, 95% CI = 1.58-5.00. compared to baseline activity ≥60-minutes per week). Other variables retained the model were not independently significant (see Appendix Q, Table Q.16).

9.12 Maintenance of behaviour change from 2- to 8-months between the intervention and control groups

The results presented in this Section are focused on those participants in the intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and then maintained that increase at 8-months. Out of the 361 intervention and 358 control group participants followed-up at 8-months, 66 intervention and 56 control participants who had maintained the initial 1-hour increase they reported at 2-months at the 8-month follow-up but, the difference in proportions was not significant between groups ($\chi^2 (1, n = 719) = 0.71, p = 0.40$).

9.13 Results of the Treatment Received analysis

The NSW RCT data were analysed by Treatment Received (TR). These results are presented in full in Appendix R and summarised here (and in Section 9.15). The TR intervention group consisted of 253 participants at 2-months and 233 participants at 8-months. Despite having 81 fewer participants in the TR intervention group than the ITT intervention group presented in the Sections 9.1 to 9.11, there were no significant differences between the TR intervention and control groups in terms of baseline demographics and physical activity data (see Appendix R, Table R.2). There were no significant differences between the number of TR intervention and control group participants recall of specific physical activity related messages (see Appendix R, Section R.1).

9.13.1 Changes in reported physical activity between baseline, 2 and 8-months in the TR intervention group

Analysis by TR did not significantly alter the results reported from the ITT analyses reported in Section 9.6. Both the TR intervention and control groups demonstrated
statistically significant increases in vigorous physical activity between baseline and 8-months (F (1, n = 548) = 4.04, p = 0.02; baseline to 8-months t = -2.27, p = 0.02). However, there was no significant group x time interaction for the pooled data. There were no other significant effects observed in either the walking, moderate or total physical activity data (see Appendix R, Table R.4).

9.13.2 Proportion of the TR intervention group meeting a 150-minute per week criterion of sufficient physical activity at baseline, 2 and 8-months

As with the ITT results there were no significant changes in the TR intervention group participants who reported reaching the U.S Surgeon Generals 150-minutes per week criterion for total physical activity at 2- or 8-months (see Appendix R, Table R.5).

9.13.3 Proportion of the TR intervention group expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

Consistent with the ITT analysis (see Section 9.8) there was a non-significant number of inadequately active TR intervention group participants at baseline increase their total energy expenditure from physical activity to the adequate category at 2-months.

However, there was significant number of inadequately active TR intervention group participants at baseline who increased their total energy expenditure from physical activity to the adequate category at 8-months. The control group also reported this change and there was no significant difference between the two study groups (see Appendix R, Section R.4).

9.13.4 Progression through the Stages of Change between baseline, 2 and 8-months by the TR intervention group

As with the ITT Stage of Change analyses (see Section 9.9) there were similar proportions within each study group in the each Stage of Change (see Appendix R, Table R.8).
There were no significant differences in the number of TR intervention group participants who progressed at least one stage between baseline, 2- and 8-months (see Appendix R, Table R.15).

9.13.5 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months by the TR intervention group

As with the ITT stage change results (see Section 9.9.2), there was no significant change within the TR intervention group in terms of movement from the inactive stages (PC, C & P) to the active stages (A & M) between baseline, 2- and 8-months (see Appendix R, Section R.5.2)

9.13.6 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months by the TR intervention group

As with the ITT stage change results (see Section 9.9.3), there was also no significant change within the TR intervention group in terms of movement from the sedentary stages (PC & C) to the active stages (P, A & M) between baseline, 2- and 8-months (see Appendix R, Section R.5.3).

9.13.7 Changes in the TR intervention groups physical activity level at 2-months adjusted for baseline physical activity level

9.13.7.1 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

There was no significant difference between the TR intervention and control groups in terms of the number of inadequately active baseline participants who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.97, 95% CI = 0.61-1.53; see Appendix R, Table R.14).

The only significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline by logistic regression was participating in <20-minutes physical activity per
week at baseline (OR = 2.00, 95% CI = 1.22-3.23) compared to baseline activity >80-minutes per week. The other variables retained in the model (marital status and education level and a baseline activity level >20 to 80-minutes per week) were not independently significant predictors of change (see Appendix R, Table R.15).

9.13.7.2 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change

There was no significant difference between the TR intervention and control groups in terms of the number of inactive staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.86, 95% CI 0.56-1.32; see Appendix R, Table R.17).

A significant predictor of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline by logistic regression was baseline activity status <20-minutes per week (OR = 2.08, 95% CI = 1.25-3.45) compared to baseline activity >80-minutes per week (see Appendix R, Table R.18).

9.13.7.3 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

There was no significant difference reported between the TR intervention or control groups in terms of the number of sedentary staged participants at baseline who increased their total physical activity by at least 1-hour (OR = 0.91, 95%CI = 0.52-1.58; see Appendix R, Table R.26).

Significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline by logistic regression revealed participants who reported having <10-years education (OR = 1.92, 95% CI = 1.11-3.23), and a baseline activity level <15-minutes per week (OR = 2.33, 95% CI = 1.08-5.00, compared to baseline activity ≥15 to 60-
minutes per week) were significantly more likely to report the 1-hour increase in total physical activity between baseline and 2-months (see Appendix R, Table R.21).

9.13.8 Changes in the TR intervention groups physical activity level at 8-months adjusted for baseline physical activity level

9.13.8.1 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

There was a significant difference between the TR intervention and control groups in terms of the number of inadequately active baseline participants who increased their total physical activity by at least 1-hour between baseline and 8-months. Whereby, the TR intervention group inadequately active participant at baseline were 1.48 times more likely to increase their total physical activity by at least 1-hour between baseline and 8-months than the inadequately active control group participants at baseline (95% CI = 1.00-2.20; see Appendix R, Table R.23).

Logistic regression also confirmed this result indicated that the inadequately active participants TR intervention group at baseline were significantly more likely to report an increase in total physical activity by at least 1-hour between baseline and 8-months than the equivalent control group participants (OR = 1.49, 95% CI = 1.00-2.19). In addition significant predictors of the 1-hour increase in total physical activity between baseline and 8-months in the inadequately active participants at baseline were i. baseline activity status <20-minutes per week (OR = 1.79, 95% CI = 1.10-2.86) compared to ≥20 to 80-minutes per week and (OR = 4.17, 95% CI = 2.50-7.14) compared to ≥80-minutes per week, ii. baseline intention to be more active within the next month (OR = 1.83, 95% CI = 1.13-3.00), and iii. speaking English at home (OR = 5.21, 95% CI = 1.13-24.02; see Appendix R, Table R.24).
9.13.8.2 **A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by inactive Stages of Change**

There was a significant difference between the TR intervention and control groups in terms of the inactive staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months. Whereby, the TR intervention group inactive staged participants at baseline were 1.54 times more likely to increase their total physical activity by 1-hour than the control group between baseline and 8-months (95% CI = 1.02-2.32; see Appendix R, Table R.26).

Logistic regression again confirmed this result, indicating that the significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were: i. being in the TR intervention group (OR = 1.58, 95% CI = 1.05-2.39), ii. speaking English at home (OR = 5.13, 95% CI = 1.12-23.78), iii. having a baseline activity level <20-minutes per week (OR = 1.67, 95% CI = 1.02-2.70, compared to ≥20 to 80-minutes per week) and (OR = 4.00, 95% CI = 2.38-6.67, compared to ≥80-minutes per week), and iv. having a baseline intention to be more active within the next month (OR = 1.90, 95% CI = 1.12-3.22; see Appendix R, see Table R.27).

9.13.8.3 **A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change**

There was a significant difference between the TR intervention and control groups in terms of the number of sedentary staged baseline participants who increased their total physical activity by at least 1-hour between baseline and 8-months. The TR intervention group sedentary staged participants at baseline were 1.91 times more likely to increase their total physical activity by at least 1-hour between baseline and 8-months than the sedentary staged control group participants at baseline (95% CI = 1.12-3.25; see Appendix R, Table R.29).
Again logistic regression found that the significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the sedentary staged participants at baseline were; i. being in the TR intervention group (OR = 1.98, 95% CI = 1.16-3.35), and ii. having a baseline activity status <15-minutes per week (OR = 2.44, 95% CI = 1.52-3.85, compared to ≥15-minutes per week; see Appendix R, Table R.30).

9.14 Results of the Treatment Received & Read analysis

The results of the NSW RCT data analysed by Treatment Received and Read (TR&R) are presented in full in Appendix S and are summarised here (and in Section 9.15). The TR&R intervention group consisted of 210 participants at 2-months and 194 participants at 8-months. Despite having 124 fewer participants in the TR&R intervention group than the ITT intervention group presented in the Sections 9.1 to 9.12, there were no significant differences between the TR&R intervention and control groups in terms of baseline demographics and physical activity data (see Appendix S, Table S.2). There were also no significant differences between the number of TR&R intervention and control group participants recall of specific physical activity related messages (see Appendix S, Section S.1).

9.14.1 Changes in reported physical activity between baseline, 2 and 8-months in the TR&R intervention group

Consistent with the results presented in Section 9.6 there was no significant effects for walking, moderate or total physical activity, but there was a significant effect over time for the vigorous intensity physical activity prevalence. Both the TR&R intervention and control groups demonstrated statistically significant increases in time spent doing vigorous physical activity between baseline and 8-months ($F = 3.53, p = 0.03$; between baseline and 8-months ($t = -2.01, p = 0.04$; see Appendix S, Table S.4)
9.14.2 Proportion of the TR&R intervention group meeting a 150-minute per week criterion of sufficient physical activity at baseline, 2 and 8-months

As with the ITT and TR results (see Sections 9.9.1 and 9.13.2) there were no significant changes in the TR&R intervention group participants who reported reaching the U.S Surgeon Generals 150-minute per week criterion for total physical activity at 2- or 8-months (see Appendix S, Table S.5).

9.14.3 Proportion of the TR&R intervention group expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

Consistent with the ITT and TR results (see Section 9.8 and 9.13.3) there was a non-significant number of inadequately active TR&R intervention group participants at baseline increase their total energy expenditure from physical activity to the adequate category at 2-months.

There was significant number of inadequately active TR&R intervention group participants at baseline increase their total energy expenditure from physical activity to the adequate category at 8-months. The control group also reported this change and there was no significant difference between the two study groups (see Appendix S, Section S.4).

9.14.4 Progression through the Stages of Change by the TR&R intervention group between baseline, 2 and 8-months

As with the ITT and TR Stage of Change analyses (see Section 9.9 and 9.13.4) there were similar proportions within each study group in the each Stage of Change (see Appendix S, Table S.8).

There were no significant differences in the number of TR&R intervention group participants who progressed at least one stage between baseline, 2- and 8-months (see Appendix S, Table S.15).
9.14.5 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months by the TR&R intervention group

Consistent with the ITT and TR results (see Section 9.9.2 and 9.13.5), there was no significant change within the TR&R intervention group in terms of movement from the inactive stages (PC, C & P) to the active stages (A & M) between baseline, 2- and 8-months (see Appendix S, Section S.5.2).

9.14.6 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months by the TR&R intervention group

Consistent with the ITT and TR results (see Section 9.9.3 and 9.13.6), there was no significant change within the TR&R intervention group in terms of movement from the sedentary stages (PC & C) to the active stages (P, A & M) between baseline, 2- and 8-months (see Appendix S, Section S.5.3).

9.14.7 Changes in the TR&R intervention groups’ physical activity levels at 2-months adjusted for baseline physical activity level

9.14.7.1 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

There was no significant difference between the TR&R intervention and control groups in terms of the number of inadequately active baseline participants who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.87, 95% CI = 0.56-1.34; see Appendix S, Table S.14).

However, logistic regression suggested significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline were; i. having a baseline activity status <20-minutes per week (OR = 1.72, 95% CI = 1.04-2.86, compared to baseline activity ≥20 to 80-minutes per week), and (OR = 2.22, 95% CI = 1.32-3.85, compared to baseline activity ≥80-minutes per week) and ii. reporting an intention to be more
active within the next month at baseline (OR = 1.80, 95% CI = 1.06-3.06; see Appendix S, Table S.15).

9.14.7.2 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change

Again there was no significant difference between the TR&R intervention and control groups in terms of the inadequately active participants at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.83, 95% CI = 0.53-1.31; see Appendix S, Table S.17).

Logistic regression showed the significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline were; i. reporting an intention to be more active within the next month at baseline (OR = 1.83, 95% CI = 1.04-3.25) and ii. reporting a baseline activity status <20-minutes per week (OR = 2.32, 95% CI = 1.37-4.17, compared to baseline activity ≥80-minutes per week; see Appendix S, Table S.18).

9.14.7.3 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

Consistent with the previous stage change results, there was no significant difference reported between the number of sedentary staged TR&R intervention or control group participants at baseline who increased their total physical activity by at least 1-hour (OR = 0.80, 95%CI = 0.44-1.46; see Appendix S, Table S.20).

Logistic regression revealed the significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline were; i. having <10-years education (OR = 1.92, 95% CI = 1.10-3.45), and ii. reporting a baseline activity status <15-minutes per week (OR = 2.86, 95% CI = 1.25-6.67, compared to baseline activity ≥15 to 60-minutes per week; see Appendix S, Table S.21).
9.14.8 Changes in the TR&R intervention groups physical activity level at 8-months adjusted for baseline physical activity level

9.14.8.1 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

There was no significant difference between the TR&R intervention and control groups in terms of the number of inadequately active baseline participants increasing their total activity prevalence by at least 1-hour between baseline and 8 months (OR = 1.32, 95% CI = 0.87-2.01; see Appendix S, Table S.23).

Logistic regression revealed significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inadequately active participants at baseline to be; i. having a baseline activity level <20-minutes per week (OR = 1.89, 95% CI = 1.15-3.03, compared to ≥20 to 80-minutes per week) and (OR = 4.35, 95% CI = 2.44-7.14, compared to ≥80 minutes per week), ii. reporting an intention to be more active within the next month at baseline (OR = 2.04, 95% CI = 1.20-3.45), and iii. speaking English at home (OR = 4.81, 95% CI = 1.64-22.17; see Appendix S, Table S.24).

9.14.8.2 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by inactive Stages of Change

Consistent with the previous TR&R baseline to 8-month 1-hour increase data there was no significant difference between the TR&R intervention and control groups inactive staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 1.36, 95% CI = 0.88-2.10; see Appendix S, Table S.26).

Logistic regression revealed significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. speaking English at home (OR = 4.67, 95% CI = 1.01-21.52), ii. reporting a baseline activity level <20-minutes per week (OR =
1.72, 95% CI = 1.04-2.86, compared to ≥20 to 80-minutes per week and (OR = 4.35, 95% CI = 2.44-7.69, compared to ≥80-minutes per week), and iii. reporting an intention to be more active within the next month at baseline (OR = 2.220, 95% CI = 1.26-3.93; see Appendix S, Table S.27).

9.14.8.3 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

Consistent with the previous results, there was no significant difference reported between the TR&R intervention or control group in terms of the number of sedentary staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 1.47, 95%CI = 0.82-2.62; see Appendix S, Table S.29).

Logistic regression revealed significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the sedentary staged participants at baseline was a baseline activity status <15-minutes per week (OR =2.86, 95% CI = 1.52-5.26, compared to ≥60-minutes per week; see Appendix S, Table S.30).

9.15 Summary of main findings

Based on the results presented in this chapter on the NSW RCT, it would appear that the self-help print intervention was not effective in promoting an increase in self-reported physical activity. This section contains four tables that summarise all the results presented in this Chapter, thus far and the supplementary Appendices.

There were no significant differences observed between the two study groups between baseline and 2-months (see Table 9.25) regardless of outcome variable or analytic strategy (ITT, TR or TR&R). Significant effects were observed within each group in the categorical analysis of the inactive or sedentary staged participants at baseline who reported a 1-hour increase in their total physical activity at 2-months.

Further, significant effects were observed between the intervention and control groups in terms of the categorical analysis of the inadequate energy expenditure as well as
inactive or sedentary staged participants at baseline who increased their total physical activity by at least 1-hour per week between baseline and 8-months (see Table 9.26). However, the significance of these results were not improved as the analyses became more specific in terms of receipt and use of the self-help print intervention in the TR and TR&R analyses. As with the Illawarra RCT, the ITT analyses had the most statistical power to detect change due to the larger sample sizes.

Furthermore, the logistic regression analysis of the baseline to 2-month data supported the observations displayed in Table 9.26, as group allocation was not a significant predictor of increasing total physical activity between (see Table 9.27). Significant predictors of change included other co-variates, such as education level, baseline intention and baseline physical activity level. A very interesting finding is shown in Table 9.28, where it appears that group allocation was a significant predictor of change between baseline and 8-months. However, as shown in Table 9.28, group allocation was no longer significant when analysed by TR&R, suggesting that it was not the self-help print intervention which prompted the increase in physical activity observed between baseline and 8-months. Other significant predictors of change were baseline intention and physical activity levels along with language spoken at home.

Based on these findings it would appear that the self-help print intervention was not effective in promoting an increase in self-reported physical activity in a state-based population sample either in the short or medium term. These findings are not consistent with the positive effects demonstrated in the regionally based Illawarra RCT (see Section 6.15). Further comparison and discussion of these findings are presented in Chapter 10.
### Table 9.25: Summary of the NSW RCT findings by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 2-months

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Intention to Treat *</th>
<th>Treatment Received **</th>
<th>Treatment Received &amp; Read ***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>between groups</td>
<td>control group (w)</td>
<td>intervention group (w)</td>
</tr>
<tr>
<td>Change in mean physical activity minutes per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moderate activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vigorous activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>150-minutes of any physical activity per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline to 2-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adequate energy expenditure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline to 2-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Movement through the Stages of Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage progression</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inactive-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sedentary-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>At least a 1-hour per week increase in physical activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate energy expenditure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactive stage of change</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sedentary stage of change</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Maintenance of behaviour change between 2 and 8-months</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Intention to Treat: group means substituted for missing data
** Treatment Received: includes only the Intervention group members who reported receiving the self-help print intervention
*** Treatment Received & Read: includes only the Intervention group members who reported receiving and reading the self-help print intervention
(w) results from within group change analyses
- $p \leq 0.05$
- $p \leq 0.001$
$0.05 < p < 0.1$
- not significant
$\times$ analysis not applicable
### Table 9.26: Summary of the NSW RCT findings by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 8-months

<table>
<thead>
<tr>
<th>physical activity</th>
<th>Intention to Treat *</th>
<th>Treatment Received **</th>
<th>Treatment Received &amp; Read ***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>between groups</td>
<td>control group</td>
<td>intervention group</td>
</tr>
<tr>
<td>change in mean physical activity minutes per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking</td>
<td>-</td>
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<tr>
<td>moderate activity</td>
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</tr>
<tr>
<td>vigorous activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>total activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>150-minutes of any physical activity per week</td>
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<td></td>
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<tr>
<td>baseline to 8-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>adequate energy expenditure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline to 8-months</td>
<td>-</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>movement through the Stages of Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stage progression</td>
<td>-</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>inactive-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>sedentary-active</td>
<td>□</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>at least a 1-hour per week increase in physical activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inadequate energy expenditure</td>
<td>•</td>
<td>-</td>
<td>•</td>
</tr>
<tr>
<td>inactive stage of change</td>
<td>**</td>
<td>**</td>
<td>•</td>
</tr>
<tr>
<td>sedentary stage of change</td>
<td>•</td>
<td>•</td>
<td>*</td>
</tr>
</tbody>
</table>

* Intention to Treat; group means substituted for missing data
** Treatment Received: includes only the Intervention group members who reported receiving the self-help print intervention
*** Treatment Received & Read: includes only the Intervention group members who reported receiving and reading the self-help print intervention (w) results from within group change analyses

- **p ≤ 0.05**
- **p ≤ 0.001**
- 0.05 < p < 0.1
- not significant
- analysis not applicable
Table 9.27: Summary NSW RCT significant odds ratios* defined by logistic regression analysis by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 2-months

<table>
<thead>
<tr>
<th>Variables entered into the model</th>
<th>Intention to Treat * inadequate energy expenditure</th>
<th>Intention to Treat * inactive stages</th>
<th>Intention to Treat * sedentary stages</th>
<th>Treatment Received ** inadequate energy expenditure</th>
<th>Treatment Received ** inactive stages</th>
<th>Treatment Received ** sedentary stages</th>
<th>Treatment Received &amp; Read *** inadequate energy expenditure</th>
<th>Treatment Received &amp; Read *** inactive stages</th>
<th>Treatment Received &amp; Read *** sedentary stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation</td>
<td>control*</td>
<td>intervention</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>intervention</td>
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<tr>
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<td>within 1-month</td>
<td>1.82</td>
<td>2.15</td>
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<tr>
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<td>within 6-months</td>
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<td>children at home</td>
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</tr>
<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>most active</td>
<td>0.42</td>
<td>0.38</td>
<td>0.50</td>
<td>0.48</td>
<td>0.43</td>
<td>0.57</td>
<td>0.45</td>
<td>0.43</td>
</tr>
</tbody>
</table>

* all odds ratios listed are significant p ≤ 0.05

* Intention to Treat: group means substituted for missing data

** Treatment Received: only intervention group members who reported receiving the self-help print intervention

*** Treatment Received & Read: only intervention group members who reported receiving and reading the self-help print intervention

Y includes only inadequately active participants by energy expenditure

**Y included only participants staged in PC, C & P

**Y included only participants staged in PC & C

ASW RCT: Results
Table 9.28: Summary of the NSW RCT significant odds ratios* defined by logistic regression analysis by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 8-months

<table>
<thead>
<tr>
<th>Variables entered into the model</th>
<th>Intention to Treat *</th>
<th>Treatment Received **</th>
<th>Treatment Received &amp; Read ***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inadequate energy expenditure</td>
<td>inactive stages</td>
<td>sedentary stages</td>
</tr>
<tr>
<td>group allocation</td>
<td>control*</td>
<td>intervention</td>
<td>1.58 1.67 1.93</td>
</tr>
<tr>
<td>age</td>
<td>≤50-years</td>
<td>≥50-years</td>
<td></td>
</tr>
<tr>
<td>gender</td>
<td>female*</td>
<td>male</td>
<td></td>
</tr>
<tr>
<td>education level</td>
<td>&lt;10-years*</td>
<td>≥10-years</td>
<td></td>
</tr>
<tr>
<td>baseline intention</td>
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<td>within 1-month</td>
<td>1.92 2.03</td>
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<tr>
<td></td>
<td>within 6-months</td>
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<tr>
<td>marital status</td>
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<td>married/defacto</td>
<td></td>
</tr>
<tr>
<td>language at home</td>
<td>non-English*</td>
<td>English</td>
<td>5.12 5.13</td>
</tr>
<tr>
<td>children at home</td>
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<td>employed*</td>
<td>unemployed</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>normal*</td>
<td>underweight</td>
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<tr>
<td></td>
<td>overweight</td>
<td>obese</td>
<td></td>
</tr>
<tr>
<td>baseline activity</td>
<td>least active*</td>
<td>middle third</td>
<td>0.22 0.23 0.36</td>
</tr>
<tr>
<td></td>
<td>most active</td>
<td></td>
<td>0.56 0.60</td>
</tr>
</tbody>
</table>

* all odds ratios listed are significant $p \leq 0.05$

** reference category<br>retained in the model but not independently significant

*** Treatment Received & Read: only intervention group members who reported receiving the self-help print intervention

** Intention to Treat: group means substituted for missing data

*** Treatment Received & Read: only intervention group members who reported receiving and reading the self-help print intervention

* includes only inadequately active participants by energy expenditure

** included only participants staged in PC, C & P

*** included only participants staged in PC & C
9.16 Over 40 years of age sub-sample analysis

Additional data analyses were conducted on a sub-sample of the NSW RCT participants, namely those subjects who were aged over 40-years of age. This was to assess the impact of the self-help print intervention at the State-wide level in the same age group as evaluated in the regional Illawarra RCT.

Removal of subjects aged under 40-years left an intervention group of 229 subjects and 225 control group subjects at baseline. The sub-sample analysis was conducted to examine a sample of similar ages to those included in the Illawarra RCT which were aged between 40- and 60-years at baseline. However, the results of these analyses were not sufficiently different from the complete NSW RCT sample data analyses presented in previous sections. Therefore, the findings of the Over 40-years of age sub-sample results are presented in Appendix T for the ITT analyses, Appendix U for the TR analyses and Appendix V for the TR&R analyses. The main findings are also presented Tables 9.29 to Table 9.31.

Based on the main findings presented in Table 9.29 there were no significant differences observed between the two study groups in terms of change in self reported physical activity between baseline and 2-months regardless of outcome categorisation.

Significant effects were observed between the intervention and control groups in terms of the categorical analysis of the inadequate energy expenditure as well as inactive or sedentary staged participants at baseline who in increased their total physical activity by at least 1-hour per week between baseline and 8-months (see Table 9.30). However, the significant of these results were reduced as the analyses became more specific in terms of receipt and use of the self-help print intervention in the TR and TR&R analyses. Therefore, these findings are not different to those presented in the overall NSW RCT data analysis (Sections 9.1 to 9.16). Furthermore, the results of the logistic regression analyses conducted on the Over 40-years of age sub-sample were also not different to those observed in the overall NSW RCT analyses (see Table 9.31 and Table 9.32). Due to the similarity of the results the discussion of the NSW RCT findings will focus on the results observed in the main data analyses presented in Sections 9.1 to 9.16.
Table 9.29: Summary of the NSW RCT Over 40 sub-sample findings by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 2-months

<table>
<thead>
<tr>
<th>physical activity outcome measures</th>
<th>Intention to Treat *</th>
<th>Treatment Received **</th>
<th>Treatment Received &amp; Read ***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>between groups</td>
<td>control group (w)</td>
<td>intervention group (w)</td>
</tr>
<tr>
<td>change in mean physical activity minutes per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>moderate activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>vigorous activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>total activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>150-minutes of any physical activity per week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline to 2-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>adequate energy expenditure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline to 2-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>movement through the Stages of Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stage progression</td>
<td>-</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>inactive-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>sedentary-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>at least a 1-hour per week increase in physical activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inadequate energy expenditure</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>inactive stage of change</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>sedentary stage of change</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>maintenance of behaviour change between 2 and 8-months</td>
<td>-</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

* Intention to Treat: group means substituted for missing data
** Treatment Received: includes only the Intervention group members who reported receiving the self-help print intervention
*** Treatment Received & Read: includes only the Intervention group members who reported receiving and reading the self-help print intervention results from within group change analyses

- $p \leq 0.05$
- $p \leq 0.001$
- $0.05 < p < 0.1$
- not significant
- analysis not applicable
Table 9.30: Summary of the NSW RCT Over 40 sub-sample findings by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 8-months

<table>
<thead>
<tr>
<th>physical activity outcome measures</th>
<th>Intention to Treat * between groups</th>
<th>Intention to Treat * control group (w)</th>
<th>Intention to Treat * intervention group (w)</th>
<th>Treatment Received ** between groups</th>
<th>Treatment Received ** intervention group (w)</th>
<th>Treatment Received &amp; Read *** between groups</th>
<th>Treatment Received &amp; Read *** intervention group (w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>change in mean physical activity minutes per week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>moderate activity</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>vigorous activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>total activity</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>150-minutes of any physical activity per week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline to 8-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>adequate energy expenditure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline to 8-months</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>movement through the Stages of Change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stage progression</td>
<td>-</td>
<td>x</td>
<td>x</td>
<td>-</td>
<td>x</td>
<td>-</td>
<td>x</td>
</tr>
<tr>
<td>inactive-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>sedentary-active</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>at least a 1-hour per week increase in physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inadequate energy expenditure</td>
<td>⬤</td>
<td>-</td>
<td>⬤</td>
<td>-</td>
<td>⬤</td>
<td>-</td>
<td>⬤</td>
</tr>
<tr>
<td>inactive stage of change</td>
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<td>**</td>
<td>-</td>
<td>**</td>
<td>-</td>
<td>**</td>
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<tr>
<td>sedentary stage of change</td>
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<td>⬤</td>
<td>-</td>
<td>-</td>
<td>☐</td>
<td>-</td>
<td>☐</td>
</tr>
</tbody>
</table>

* Intention to Treat: group means substituted for missing data  
** Treatment Received: includes only the Intervention group members who reported receiving the self-help print intervention  
*** Treatment Received & Read: includes only the Intervention group members who reported receiving and reading the self-help print intervention  
(w) results from within group change analyses  

- $p \leq 0.05$  
- $p \leq 0.001$  
- $0.05 < p < 0.1$  
- not significant  
- analysis not applicable
Table 9.31: Summary significant NSW RCT Over 40 sub-sample odds ratios defined by logistic regression analysis by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 2-months

<table>
<thead>
<tr>
<th>Variables entered into the model</th>
<th>Intention to Treat * inadequate energy expenditure</th>
<th>Intention to Treat * inactive stages **</th>
<th>Intention to Treat * sedentary stages ***</th>
<th>Treatment Received ** inadequate energy expenditure</th>
<th>Treatment Received ** inactive stages</th>
<th>Treatment Received ** sedentary stages</th>
<th>Treatment Received &amp; Read *** inadequate energy expenditure</th>
<th>Treatment Received &amp; Read *** inactive stages</th>
<th>Treatment Received &amp; Read *** sedentary stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation</td>
<td>control*</td>
<td></td>
<td></td>
<td>intervention</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>&lt;50-years</td>
<td></td>
<td></td>
<td>≥50-years</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender</td>
<td>female*</td>
<td></td>
<td></td>
<td>male</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>education level</td>
<td>&lt;10-years*</td>
<td></td>
<td></td>
<td>≥10-years</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline intention</td>
<td>none*</td>
<td></td>
<td></td>
<td>within 1-month</td>
<td>1.89</td>
<td>○</td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>marital status</td>
<td>single*</td>
<td></td>
<td></td>
<td>married/defacto</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>language at home</td>
<td>non-English*</td>
<td></td>
<td></td>
<td>English</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>children at home</td>
<td>yes*</td>
<td></td>
<td></td>
<td>no</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>employment</td>
<td>employed*</td>
<td></td>
<td></td>
<td>unemployed</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>normal*</td>
<td></td>
<td></td>
<td>underweight</td>
<td></td>
<td></td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity</td>
<td>least active*</td>
<td></td>
<td></td>
<td>middle third</td>
<td>○</td>
<td>○</td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>most active</td>
<td>0.49</td>
<td>0.46</td>
<td>retained in the model but not independently significant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* all odds ratios listed are significant \( p \leq 0.05 \)
* Intention to Treat: group means substituted for missing data
** Treatment Received: only intervention group members who reported receiving the self-help print intervention
*** Treatment Received & Read: only intervention group members who reported receiving and reading the self-help print intervention
\( ^* \) includes only inadequately active participants by energy expenditure
\( ^{**} \) included only participants staged in PC, C & P
\( ^{***} \) included only participants staged in PC & C
<table>
<thead>
<tr>
<th>Variables entered into the model</th>
<th>Intention to Treat</th>
<th>Treatment Received</th>
<th>Treatment Received &amp; Read</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inadequate energy expenditure</td>
<td>inactive stages</td>
<td>sedentary stages</td>
</tr>
<tr>
<td>group allocation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intervention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50-years</td>
<td>1.84</td>
<td>1.90</td>
<td>1.90</td>
</tr>
<tr>
<td>≥50-years</td>
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</tr>
<tr>
<td>gender</td>
<td></td>
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<td></td>
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<tr>
<td>female*</td>
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<td></td>
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<tr>
<td>male</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>education level</td>
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<td></td>
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<tr>
<td>&lt;10-years*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥10-years</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>baseline intention</td>
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<td></td>
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<tr>
<td>none*</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>within 1-month</td>
<td>2.08</td>
<td>2.15</td>
<td>1.93</td>
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<td>within 6-months</td>
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<td></td>
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<tr>
<td>single*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>married/defacto</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>language at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>non-English*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>children at home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes*</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>no</td>
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<tr>
<td>employment</td>
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<tr>
<td>unemployed</td>
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</tr>
<tr>
<td>BMI</td>
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<td></td>
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<tr>
<td>normal*</td>
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<tr>
<td>underweight</td>
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<tr>
<td>obese</td>
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<tr>
<td>baseline activity</td>
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<td>least active*</td>
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<td></td>
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<tr>
<td>middle third</td>
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<td></td>
</tr>
<tr>
<td>most active</td>
<td>0.26</td>
<td>0.36</td>
<td>0.45</td>
</tr>
</tbody>
</table>

* all odds ratios listed are significant \( p \leq 0.05 \)
* Intention to Treat: group means substituted for missing data
** Treatment Received: only intervention group members who reported receiving the self-help print intervention
*** Treatment Received & Read: only intervention group members who reported receiving and reading the self-help print intervention
\( ^v \) includes only inadequately active participants by energy expenditure
\( ^y \) included only participants staged in PC, C & P
\( ^yy \) included only participants staged in PC & C

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**Table 9.32:** Summary of the NSW RCT Over 40 sub-sample significant odds ratios defined by logistic regression analysis by Intention to Treat, Treatment Received and Treatment Received & Read: Baseline to 8-months
10. NSW Randomised Controlled Trial: Summary Discussion

The purpose of the NSW RCT was to evaluate the potential of the self-help print intervention to promote physical activity to an undifferentiated sample of adults aged between 20- and 65-years selected from a State-wide population. It was a replication of the Illawarra RCT to allow more accurate conclusions to be drawn in relation to the effectiveness of a self-help print intervention as a mass distribution, population-wide physical activity promotion imitative. The same self-help print materials and methods as were used in the Illawarra RCT were applied to a randomly selected sample of adults residing in the State of NSW.

The NSW RCT included participants who were originally interviewed to create a benchmark on which to evaluate the recall of the ongoing ‘Active Australia’ mass media campaign*. Like the Illawarra RCT, the NSW RCT randomised participants to either an intervention or control group.

After the baseline data were collected, the intervention group were sent the self-help print intervention through the mail. However, unlike the Illawarra RCT there was no additional contact with the intervention group participants between the baseline and 2-month follow-up to conduct the process evaluation of the self-help print intervention materials. Instead the process evaluation of the self-help print intervention in the NSW RCT was included in the scheduled 2-month follow-up survey (see Section 8.5.1). The NSW RCT study participants were also scheduled to

* The ‘Active Australia’ campaign was evaluated in terms of its impact on self-reported physical activity levels in a randomly selected sample of the residents of NSW (Bauman, Bellew et al., 1998). In fact the cohort followed-up to evaluate the ‘Active Australia’ media campaign formed the basis of the NSW RCT sample (see Section 8.2). These data indicated there was a significant increase in the awareness of the ‘Active Australia’ media campaign but no change in self-reported physical activity between surveys (Bauman, Bellew et al., 1998). In fact there was a significant decrease in walking prevalence (average -22 minutes a week; \( p < 0.01 \)), a non-significant decreases in vigorous (average -5.4 minutes a week) and moderate (average -5 minutes a week) physical activity. Therefore, one could presume that the ‘Active Australia’ campaign had limited impact on the self-reported physical activity levels of the NSW RCT sample. Nonetheless, ongoing monitoring of the NSW RCT participants recall of exercise related media was conducted and found to be not significantly different between the two study groups (see Section 9.4).
receive another follow-up at 8-months post baseline (see Section 8.1). All data were collected by self-report telephone interviews (see Section 8.4), and analysed using strategies described in Sections 5.8, 5.9 and 5.10.

This study was the first to evaluate a population-based, intervention strategy in a proactively recruited random sample selected from a State-wide population. This Chapter presents a summary discussion of the main findings of the NSW RCT, which were presented in full in Chapter 9 (supplementary results were presented Appendices P through to U, and are also summarised in Tables 9.25 to Table 9.32). A comparison between the NSW RCT and the Illawarra RCT is presented in Chapter 11.

10.1 Main findings of the NSW RCT

As with the Illawarra RCT, the two study groups used in the NSW RCT were shown to be comparable in terms of demographic characteristics and baseline physical activity levels across the three analytic strategies applied to the intervention group (i.e., by ITT, TR and TR&R; see Section 9.3, Appendix R and Appendix S). Furthermore, both study groups also recalled similar background media influences at all three data collection periods (see Section 9.4, Appendix R, Section R.1 and Appendix S, Section S.1). Therefore, the two study groups were shown to be similar so that any differences observed throughout the trial were not likely to be due to between-group differences.

Process evaluation of the self-help print intervention at 2-months post baseline revealed that over 76% (n = 253) of the intervention group reported receiving the self-help print intervention in the mail, and that over 63% (n = 210) reported they actually read the booklets (see Section 9.5)*. These findings are slightly lower than the recognition and usage rates observed in the Illawarra RCT, but still good in terms of the dissemination method used.

* Like the Illawarra RCT, these data also allowed more accurate comparisons between the intervention group participants who received (TR) and/or received and read the treatment (TR&R) the self-help print intervention, with the control group, rather than simply relying on ITT analysis (see Section 5.9)
To determine the effect the mail distributed self-help print intervention had on reported physical activity levels, the same hypotheses that were set at the beginning of the thesis and used in the Illawarra RCT were applied to the NSW RCT (see Section 1.5*). This ensured that accurate comparisons could be made between the results of the two trials, which will be discussed in Chapter 11. The following Sections 10.2 to 10.10 address each specific hypothesis and briefly compares the findings to those reported both in the Illawarra RCT and in previous research.

10.2 Changes in reported physical activity between baseline, 2 and 8-months

Hypothesis 1: After receiving the self-help print intervention in the mail the intervention group would; a. increase the time spent walking, b. increase the time spent participating in moderate physical activity, c. not change the time spent participating in vigorous physical activity†, and d. increase total physical activity time, per week between baseline and 2-months and baseline and 8-months, compared to the control group whose activity levels would not significantly change.

a. Time spent walking per week: Despite the intervention group reporting a mean increase in time spent walking of 6-minutes per week compared to no change in the control group between baseline and 2-months, there was no significant difference observed between the two study groups (see Section 9.6.1). Interestingly, however, both study groups reported a slight, but not significant increase in time spent walking per week between baseline and the 8-month follow-up. These findings suggest that the self-help print intervention was not effective in increasing the time spent walking per week in the intervention group between baseline and 2-months nor between baseline and 8-months. These results are in contrast to the results of the Illawarra RCT where significant increases were reported by the intervention group 2-months post baseline (see Section 7.2).

* Except that the second follow-up period was extended to 8-months to allow for the change in Season and daylight savings time to be consistent with the baseline data collection period (see Section 8.4.3)
† It is important to note that it was not one of the aims of the self-help print intervention to promote vigorous intensity physical activity, unless the participant was already regularly active at a moderate intensity.
b. **Time spent doing moderate physical activity per week:** The intervention group reported a decrease in their participation in moderate physical activity per week between baseline and 2-months, while the control group reported an increase moderate activity participation remained relatively stable. These results differ from those reported in the Illawarra RCT where a non-significant increase in moderate physical activity (+48-minutes per week) was observed in the intervention group between baseline and 2-months (see Section 7.2). However, as with the walking data presented in the current trial, there was a slight increase observed in moderate activity in the intervention group up to 8-months while the control group reported a slight decrease in moderate physical activity. Despite, these findings the differences between the NSW RCT intervention and control groups were not statistically significant (see Section 9.6.2). Hence the self-help print intervention had little to no effect on the participants’ moderate physical activity participation levels.

c. **Time spent doing vigorous physical activity per week:** Interestingly the intervention group reported an increase in vigorous physical activity between baseline and 2-months, which increased again by the 8-month follow-up. The control group reported a decrease between baseline and 2-months and an increase between baseline and 8-months. A significant effect of time was observed in the pooled group data between baseline and 8-months, but no other significant effects were observed (see Section 9.6). Therefore, there was no significant effect observed in the intervention group over the control group in terms of reported vigorous physical activity. Again these results did not differ from those observed in the Illawarra RCT where minimal change in vigorous physical activity was observed over the course of the study.

d. **Total time spent doing physical activity per week:** The control groups’ mean total physical activity data remained relatively stable between baseline and 2-months, while the intervention group demonstrated a non-significant increase of 6-minutes per week. However, between baseline and 8-months the control group reported an 8-minute per week increase in total physical activity where the intervention group simply maintained the initial increase which was observed at 2-months. Hence, there was no significant difference observed between the two study groups total reported physical activity over the study
period (see Section 9.6.4). Consequently, any effect the self-help print intervention may have had on increasing the total physical activity levels in the intervention group between baseline and 2-months or supporting a maintenance effect up to 8-months cannot be substantiated.

Similar findings were observed when the data were analysed by TR and TR&R (see Appendix R Section R.2 and Appendix S, Section S.2). Therefore, the self-help print intervention had little impact on self-reported physical activity levels over the short or medium term when delivered through the mail to a sample of inactive adults living in NSW.

These results were not different to those observed in the Illawarra RCT and other self-help stage based interventions, which have generally demonstrated success in the short term (Marcus, Bock et al., 1998, Marcus, Emmons et al., 1997; Cardinal & Sachs 1996; Marcus, Banspach et al., 1992). However, unlike the Illawarra RCT, the NSW RCT sample consisted of participants selected from more diverse environmental situations and backgrounds, and was therefore, even more unlike the ‘volunteer’ participants involved in previous intervention trials.

Interestingly, the slight increases in reported activity at 8-months may imply some long-term effect of the self-help print intervention, however this suggestion is not empirically supported here.

10.3 Proportions of the intervention and control groups meeting a 150-minute per week criterion of sufficient physical activity at baseline, 2 and 8-months

Hypothesis 2: After receiving the self-help print intervention in the mail, more of the intervention group participants' would be meeting a criterion of sufficient physical activity criterion, at least 150-minutes of physical activity per week than the control group at both the 2- and 8-month follow-ups.

There was no significant difference between the study groups in the NSW RCT terms of number of participants meeting the 150-minute per week criterion at the 2- and 8-month follow-ups. Furthermore, there was no significant increase in the number participants meeting the 150-minute criterion between baseline, 2- or 8-months in either study group (see Section 9.7).
Again similar results were observed when the data were analysed by TR (see Appendix R, Section R.3) or TR&R (see Appendix S, Section S.3). Therefore, it would appear that there was no effect on number of participants meeting the 150-minute per week physical activity criterion. These findings are similar to the Illawarra RCT in terms of the non-significant difference between groups, although the Illawarra RCT data did reveal significant within group differences between baseline and 2-months (see Table 6.22).

When compared to the stricter definition of 150-minutes in at least five, 30 minute sessions of physical activity reported by Dunn, Marcus et al. (1997), there were fewer NSW RCT participants reporting at least 150-minutes per week, at around 30% in both study groups compared to 78% in the lifestyle intervention group in the Dunn, Marcus et al. (1997) study. Therefore, it would appear the self-help print intervention disseminated as part of the NSW RCT was less effective than previous intervention trials in trying to promote the adoption of sufficient physical activity to meet the criterion of at least 150-minutes of physical activity a week.

10.4 Proportions of the intervention and control groups expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

Hypothesis 3: After receiving the self-help print intervention in the mail, the intervention group would have significantly more participants expending adequate amounts of energy (>800kcal per week) through increased physical activity at the 2- and 8-month follow-ups, compared to the control group whose energy expenditure levels would not significantly increase.

There were no significant differences in between the two study groups in terms of the number of participants expending adequate amounts of energy from physical activity at baseline, 2- or 8-months. However, it should be noted that a significant number of participants within each group increased their level of estimated energy expenditure from physical activity to the adequate level between baseline and 8-months (see Section 9.8) which is consistent with the increase in reported vigorous physical activity reported in section 10.2.

Similar results were observed between groups in terms of adequate energy expenditure categorisation between baseline and 8-months when the data were analysed by TR and TR&R, but the results within the intervention group in both
these analyses were significant (see Appendix R, Section R.4 and Appendix S, Section S.4 and Table 9.26). However, while the significant effects were maintained up to 8-months the level of significance diminished between the ITT, TR and TR&R analyses. Hence, influence of the self-help print intervention in supporting these increases in adequate energy expenditure is not supported.

Once more, these results are in contrast to the significant effects reported in the Illawarra RCT and by previous stage-based interventions (Dunn et al., 1999; Dunn, Garcia et al. 1998; Cardinal & Sachs, 1996; see Section 7.4), indicating the self-help print intervention was not as successful in promoting an increase in energy expenditure from physical activity when applied to a large State-based sample.

10.5 Movement through the Stages of Change: Stage progression between baseline, 2 and 8-months

*Hypothesis 4a: After receiving the self-help print intervention in the mail the intervention group would demonstrate significant stage progression (movement in a positive direction through the Stages of Change), between baseline and 2-months and baseline and 8-months, compared to the control group whose Stage of Change would remain relatively stable.*

The NSW RCT samples were similar in terms of the number of participants in each Stage of Change and although these proportions did not change much during the trial they were quite different to the baseline proportions in the Illawarra RCT (see Sections 6.9 and Section 9.9). There were more participants in the early Stages of Change (PC, C and P) in the NSW RCT (67%) compared to the Illawarra RCT (57%). There were 7% more participants categorised in PC (those participants who have no intention of changing their behaviour) in the NSW RCT which may have made it more difficult for the self-help print intervention to have a real impact in terms of physical activity participation.

Both study groups showed a decrease in the number of participants in the early Stage of Change (P), as well as decreases in the A Stage of Change at the 2-month follow-up. These decreases were balanced by an increase in the proportion of participants in the M Stage of Change at 2-months. These changes in proportions seem to indicate a linear progression of participants from the early stages (C, P, & A) to the M stage over the first 2-months of the study. Similar generic stage movement was shown at 8-months and, unlike the Illawarra RCT, additional increases in the M stage were
observed up to 8-months. The basic stage changes were a little less consistent as compared to the Illawarra RCT, where the intervention group performed slightly better than the control group in terms of basic stage movement. Nonetheless, it appears that there was little difference between the two study groups in this study in terms of basic stage movement and that the increase in the M stage up to 8-months may have been facilitated by something other than the self-help print intervention.

Furthermore, there was little movement into or out of the PC Stage of Change, with only slight fluctuations observed. Success in terms of impacting upon participants in the PC Stage of Change would be to move them into C which involves the PC participants simply recognising they have a problem behaviour. This would not necessarily translate into a change in behaviour (or reported physical activity levels). The fact these participants move out of PC into C would be indeed a positive finding. However, one should not ignore that people in PC are generally considered ignorant of the fact they need help and often disregard any attempt to suggest otherwise. Therefore, it may be overly ambitious to expect an intervention effect to be generated simply on the change in attitude of the PC sample.

There was no significant difference between the two study groups in terms of forward progression through the Stages of Change between baseline and 2-months or between baseline and 8-months (see Section 9.9). Similar results were observed when analysed using only the TR and TR&R intervention group participants (see Section 9.9.1). These results further reinforce that the self-help print intervention was not effective even when it was received and read by the participants in the representative sample evaluated in the NSW RCT.

10.6 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months

Hypothesis 4b: After receiving the self-help print intervention in the mail the intervention group would demonstrate significant categorical stage change from inactive stages (PC, C & P) to the more active stages (A & M), compared to the control group whose categorical Stage of Change would remain relatively stable.

There was no significant difference observed in either study group in terms of the number participants moving from the inactive Stages of Change (PC, C & P) to the more active Stages of Change (A & M) between baseline and 2-months or baseline
and 8-months (see Section 9.9.2). These results were the same when analysed by TR and TR&R (see Appendix R, Section R.5.2, Appendix S, Section S.5.2 and Tables 9.25-9.26).

Therefore, it seems that the self-help print intervention was not an effective strategy to promote movement through the Stages of Change in the intervention group, as the changes in stage were not significantly different from the natural stage change observed in the control group. Again these results are in contrary to those of previous research and the Illawarra RCT (see Section 7.5), but the differences between the two RCT study samples should be noted and are discussed in further detail in Chapter 11.

10.7 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months

Hypothesis 4c: After receiving the self-help print intervention in the mail the intervention group would demonstrate significant categorical stage change from sedentary stages (PC & C) to the more active stages (P, A & M), compared to the control group whose categorical Stage of Change would remain relatively stable.

As with the previous results, there was no significant difference observed in either study group in terms of the number participants moving from the sedentary Stages of Change (PC & C) to the more active Stages of Change (P, A & M) between baseline and 2-months or baseline and 8-months (see Section 9.9.2). These results were the same when analysed by TR and TR&R (see Appendix R, Section R.5.3, Appendix S, Section S.5.3 and Tables 9.25-9.26). These results may also be a reflection of the greater number of participants in PC with no intention of changing their behaviour, but are probably more likely due to the self-help print intervention being ineffective when distributed to a non-cohesive sample selected from a State-wide population.

Nevertheless, it appeared that the self-help print intervention was not an effective strategy to promote movement through the Stages of Change in the intervention group, as once again the changes in stage observed in the intervention group were not significantly different from the natural stage change observed in the control group. Once more these findings were not consistent with those of previous studies reported in the literature (see Section 7.7).
10.8 A comparison between the inadequately active intervention and control group participants at baseline who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

**Hypothesis 5a:** After receiving the self-help print intervention in the mail a significant proportion of inadequately active intervention group participants* at baseline would show at least a 1-hour increase in total physical activity per week between baseline and 2-months, compared to the inadequately active control group participants at baseline.

The inadequately active intervention group participants at baseline in the NSW RCT were no more likely to report a 1-hour increase in their total physical activity at 2-months than were the inadequately active control group participants at baseline (see Section 9.10.1).

Logistic regression analyses observed here concur with previous determinants research in that those participants who reported an intention to be more active in the next month at baseline (but were classified as inadequately active at baseline) were 2.27 times more likely to report at least a 1-hour increase in total physical activity compared to those who reported no intention. Bauman et al. (1998b) found similar results in a randomly selected sample of NSW residents. This result is not surprising and is consistent with the theory behind the Stages of Change, insomuch that it appears likely that people who are ready or intend to change will do so with a minimal amount of attention or assistance. Therefore, it appears that an immediate intention to be more active is a very important factor to consider when designing and implementing an intervention, as those participants who reported an intention to be more active within ‘6-months’ did not significantly alter their behaviour.

In another independent sample of Australian adults people who had never been married (or were single) were more likely to report an adequate amount of physical activity (Booth et al., 1995), which is also consistent with the findings of the present ITT analyses (see Section 9.10.1). Another significant predictor of increasing total

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* Inadequately active classified by inadequate energy expenditure (see Section 5.8.4.1), the inactive Stages of Change (see Section 5.8.5.2) or the sedentary Stages of Change (see Section 5.8.5.3).
physical activity by at least 1-hour at 2-months, was being in the lowest tertial for physical activity at baseline. This may be explained by the fact these people have the greatest scope for increasing their reported physical activity as this category was only significant compared to the highest category of baseline physical activity.

When the inactive sample at baseline were defined by the inactive Stages of Change (PC, C & P) there was no significant difference between the two study groups in terms of the number who reported an increase in their total activity status of at least 1-hour between baseline and 2-months. However, as found in the inadequate energy expenditure analyses significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months were; being single, participating in <20-minutes of physical activity per week at baseline and/or reporting some intention to increase their physical activity within the next month at baseline (see Section 9.10.2 and Table 9.27).

Similar results were also observed when the inadequately active participants at baseline were defined by the sedentary Stage of Change (see Section 9.10.3). It is also interesting that the same predictors of change were observed here as with the inadequate energy expenditure category reported in the previous paragraphs, but that education level ≥10 years was again found to be a significant predictor of change. This result is particularly intriguing since it is the opposite of the predictor variable observed in the Illawarra RCT, where, the least educated (<10-years formal education) participants were more likely to report a 1-hour increase in total physical activity between baseline and 2-months (see Table 6.24). This is of interest as the self-help print intervention was also found to be significantly effective in the Illawarra RCT.

The same results were observed when the data were analysed by TR (see Appendix R, Section R.6) and TR&R (see Appendix S, Section S.6). Therefore, it may be concluded that the self-help print intervention had no effect on increasing the physical activity levels of the inadequately active participants at baseline either in the ITT, TR or TR&R analysis within the NSW RCT sample.
10.9 A comparison between the inadequately active intervention and control group participants at baseline who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

Hypothesis 5b: After receiving the self-help print intervention in the mail a significant proportion of inadequately active intervention group participants at baseline would show at least a 1-hour increase in total physical activity per week between baseline and 8-months, compared to the inadequately active control group participants at baseline.

The findings presented in this section are somewhat surprising as they tend to contradict the results observed in the NSW RCT presented thus far. The inadequately active intervention group participants in the NSW RCT sample were shown to be 1.6 times more likely to report at least a 1-hour increase in their total physical activity between baseline and 8-months than the inadequately active control group participants at baseline (see Section 9.11.1). Subsequent, logistic regression analysis confirmed this to be the case (see Table 9.24). In isolation this seems to be a very positive finding in terms of the effectiveness of the self-help print intervention, but before discussing these results, it was important to consider the results of the TR and TR&R analyses too. Other significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the inadequately active participants at baseline were reporting; i. a baseline activity level <20-minutes per week, and iii. an intention to be more active within the next month at baseline. Again these variables as significant predictors of changing in physical activity are consistent with the principles of the Stage of Change theory and the fact these people have the greatest potential and interest for increasing their reported physical activity (see Section 10.8).

The TR analysis of the 8-month data confirmed the ITT finding whereby, the inadequately active TR intervention group participants were 1.54 times more likely to increase their physical activity by 1-hour than the inadequately active control group participants between baseline and 8-months (see Appendix R, Section R.7.1). Again the logistic regression revealed significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. being in the TR intervention group, ii. having a
baseline activity level <20-minutes per week, iii. reporting an intention to be more active within the next month baseline and in addition iv, speaking English at home. The interesting finding is that group allocation was not retained as a significant predictor in the TR&R analysis (see Appendix S, Section S.7.1 and Table 9.28). This is interesting because as the intervention group became more defined in terms of receipt of (TR) and/or use of (TR&R) the intervention materials the significance of the result diminished making the difference from the control group less noteworthy. This may be attributable to the sample size reduction, and subsequent loss of statistical power. Hence, the significance of the actual self-help print intervention in effecting these results is questionable, particularly in light of previous findings showing no intervention effect. However, one must remember than the intervention group did report a steady increase in vigorous physical activity, yet on the other hand the control group reported a greater overall increase in total physical activity over the course of the study (see Section 9.6.3). Therefore, it does not seem likely that the self-help print intervention was responsible for the effects reported here.

Similar results were observed when the inadequately active participants at baseline were defined by the inactive Stages of Change (see Section 9.11.2, Appendix, R, Section R.7.2). However, when the sedentary Stages of Change defined the inadequately active participants at baseline, group allocation was no longer significant in the TR&R analyses (see Appendix S, Section S.7.3 and Table 9.28).

Therefore, taking into consideration the three levels of categorising the inadequately active participants at baseline (inadequate energy expenditure, inactive Stage of Change and sedentary Stage of Change) and the three analytic strategies (ITT, TR and TR&R) it may be that the significant effects observed in the intervention group were not supported by the self-help print intervention itself. However, what is more likely is that some other factor other than group allocation influenced these findings. This statement is supported by the fact that as the analysis became more specific in terms of the receipt and use of the self-help print intervention the significance of the intervention effect diminished. Furthermore, when compared to the results of the Illawarra RCT it is unlikely that the self-help print intervention would have produced significant effects at 8-months post baseline, without having some effect at 2-months. As was observed in the Illawarra RCT (see Section 7.8, Section 7.9 and Table 6.27). Similarly it has been repeatedly shown that similar physical activity interventions
tend to produce short-term effects whilst the intervention is in operation (Marcus, Bock et al., 1998; Marcus, Emmons et al., 1997; Cardinal & Sachs, 1996; Marcus, Banspach et al., 1992) and weaken as time goes by. Considering these factors the results of the NSW RCT are somewhat unexpected, and the effects shown in the intervention groups' inadequately active baseline participants at 8-months should be interpreted with caution.

10.10 Maintenance of behaviour change from 2- to 8-months between the intervention and control groups

Hypothesis 6. After receiving the self-help print intervention in the mail more of the intervention group participants who reported an initial 1-hour increase in total physical activity at 2-months would maintain that increase up to 8-months, compared to the control group.

There was no significant difference between the number of the intervention and control group participants who reported a 1-hour increase between baseline and 2-months and maintained that increase at the 8-month follow-up (see Section 9.12). This non-significant result was also observed in the TR and TR&R analysis (see Section R.8 and Section S.8). Therefore, it appeared that the self-help print intervention was not effective in assisting the intervention group participants to maintain the initial (non-significant) increase in total physical activity observed at 2-months up to 8-months.

These results further support the fact the significant intervention group effects observed at 8-months (see Section 10.9) might not have been brought about by the self-help print intervention itself. Therefore, it may be concluded that the self-help print intervention was not all that successful in promoting physical activity either in the short- or medium-term in this larger, undifferentiated sample of participants sampled from a State-wide population.

10.11 Main findings of the NSW RCT sub-sample aged over 40-years

The results of the separate analysis of the NSW participants aged over 40 years of age at baseline were not sufficiently different from the results presented thus far. Therefore, further discussion of these results is not necessary. However the results were presented in full in Appendix T, Appendix, U, and Appendix V and summarised in Tables 9.29 to 9.32.
10.12 Summary discussion of the NSW RCT

The NSW RCT was one of the first studies to evaluate the effects of a self-help print intervention disseminated through the mail on physical activity levels in an undifferentiated sample of adults selected from a State-wide population. This trial replicated and extended the Illawarra RCT. Similar methodologies were used in both trials (apart from the process evaluation, see Section 8.5.1) and comparable response rates for each follow-up were also obtained. Unfortunately, the findings of the NSW RCT failed to replicate the modest but significant positive findings observed in the previous trial. The findings of the NSW RCT also challenge the findings of other previous research on interventions based on the Stages of Change (Marcus, Bock, et al., 1998; Marcus, Emmons et al., 1997; Cardinal & Sachs, 1996; Marcus, Banspach et al., 1992), where significant short-term effects were generally observed following a physical activity intervention.

Due to resource limitations it was not possible to measure a detailed set of proximal predictors of change. This limited the capacity to assess some of the other effects the self-help print intervention may have had (especially in terms of changes in physical activity knowledge, and attitudes). Nonetheless based on the findings observed in the present trial the effectiveness of self-help print interventions in promoting participation in physical activity to a State-wide population is questionable. Perhaps it may be optimistic to expect a one-off mailing of a self-help print intervention to have significant long-term effect, but it was reasonable to try to and replicate the small but consistent increases in reported physical activity observed in the Illawarra RCT. The difference in samples and environments between the two separate trials may help explain some of the differences in the main findings (see Section 11.1, and Section 11.3). However, it may maybe that merely educating people to look for opportunities to be active and presenting methods shown to be useful in previous trials was not enough to motivate a more diverse randomly selected State-wide sample of participants to change their behaviour.

Further discussion of the results of both the NSW and Illawarra RCTs’ and the potential future of the self-help print intervention as a method to promote physical activity is presented in Chapter 11.
11. Final Discussion and Conclusions

The purpose of this thesis was to design and evaluate the potential of a low-cost, self-help print intervention to promote physical activity in two large randomly selected samples that were representative of adults living in the community. The self-help print intervention was designed, using a component of the Transtheoretical model, the Stages of Change (Marcus, Banspach et al., 1992; Marcus, Rossi et al., 1992), to promote the new recommendation for regular moderate physical activity (see Section 2.3).

Using the Stages of Change to develop the self-help intervention enabled a more individualised approach to physical activity promotion by replacing the action orientated ‘one size fits all’ approach currently offered by mass media. The Stages of Change approach enables a more tailored intervention suitable for people with varying levels of interest in physical activity to be developed. This intervention could effectively reduce provider burden and boost the morale of individuals, as people are encouraged to move through the Stages of Change to a more active way of life. The first booklet in the ‘Active Living’ series was designed to meet the needs of those people in the first Stage of Change, Pre-Contemplation. This booklet aimed to change the individuals perception of the importance of physical activity for health. The next booklet aimed at the Contemplation Stage of Change included suggestions for slight behavioural adjustments. More substantial suggestions for change were provided and encouraged in the subsequent booklets in the ‘Active Living’ series which were aimed at the Preparation and Action/Maintenance Stages of Change. The ultimate aim of the self-help print intervention was to lead individuals through the adoption of a more active way of life. From a public health perspective even modest increases in physical activity across large sections of the population would be an important achievement. Increased levels of physical activity across whole populations would noticeably reduce the incidence and health care costs associated with chronic lifestyle diseases (such as
Cardiovascular Disease, type 2 diabetes and hypertension) typically associated with physical inactivity (Stephenson et al., 2000; Arrol & Swinburn, 1994).

The ‘Active Living’ booklets were designed to be delivered through the mail. This particular dissemination method was chosen as it has the potential to reach large sections of the population at low cost. It was also envisaged that a mail-based dissemination method might be easily adopted by organizations involved in the promotion of physical activity.

Previous studies which have used similar types of interventions to promote physical activity in work-sites (Marcus, Emmons et al., 1997; Cardinal & Sachs, 1996) and in the community (Marcus, Bock et al., 1998; Marcus, Banspach et al., 1992). However, they have generally relied on reactively recruited volunteer participants to evaluate the effectiveness of the intervention. Therefore, the results of these previous trials typically present a ‘best case scenario’ for the effectiveness of their interventions. The two studies presented in this thesis were evaluated using pro-actively recruited participants randomly selected from two free-living populations. The first trial was a regional trial (the Illawarra RCT) and the second replication trial was a State-wide trial (the NSW Trial). Both samples used were broadly representative of the populations from which they were drawn. This is an important factor as it is essential to investigate the effectiveness of an intervention in the target population, where it has the potential for the greatest returns in terms of public health impact. It is particularly important that when evaluating a program that will be broadly implemented in a community that the study sample includes inactive people who have no desire to seek help. These ‘hard to reach’ segments of the population are generally the ones in most need of intervention (Marcus & Forsyth, 1999). This is an important factor to remember when considering the major findings presented in this thesis. Both the RCTs’ conducted were unique in that the participants involved were not volunteers.
and, were therefore, blind to the reasons behind the research and were not biased in terms wanting to achieve a specified outcome*

The effectiveness of the self-help print intervention as a method to promote physical activity was, therefore, evaluated in two randomly selected samples of adults. These trials were the first such studies to adopt a pro-active, population-wide sampling strategy to test the effectiveness of the self-help intervention delivered through the mail as a method to combat physical inactivity in whole populations. All data were collected using self-report telephone interviews at baseline and at 2- and 6-months in Study I, the Illawarra regional RCT and at 2- and 8-months in Study II, the NSW State-wide RCT.

This Chapter will firstly discuss the differences between the two trials, followed by a review of the strengths and limitations of each study (previously mentioned in Section 1.4). Thereafter, the main findings of both trials are discussed in terms of the effectiveness of the self-help print intervention as a method of promoting physical activity to adults and finally, recommendations for future research are suggested.

11.1 Differences between the Regional Illawarra and the State-based NSW RCT’s

The two trials evaluated in this thesis used similar participant recruitment methods, data collection strategies as well as the same self-help print intervention materials and dissemination methods. However, there were some differences between the two trials that need to be considered when comparing the major findings. The main differences between the two trials were:

1. The sample selection area. The study participants in the Illawarra RCT were randomly selected from a regional community on the South East coast of NSW.

* Unlike previous community research into physical activity promotion, smoking cessation or drug trials, where participants usually become involved in the studies with a preconceived idea of changing their behaviour. This method of sample recruitment can bias the results towards the intended outcome. The recruitment methods used in this thesis, therefore, present a more conservative assessment of the effectiveness of the intervention, as the participants did not remain in the study with the predetermined idea of increasing their physical activity level.
Discussion and Conclusions

The NSW RCT participants were sampled from the State-wide population. The implications of this are that the Illawarra trial was conducted in a closed regional community, which had environmental factors conducive to the promotion of physical activity in terms of climate, opportunity and convenience. While the State of NSW consists of many different regions, all of which possess different climatic conditions as well as diverse opportunities and different levels of support for physical activity*. Hence, despite the NSW RCT sample being representative of the NSW State-wide population (see Section 9.1) it is a much more diverse sample, different to the sample from the Illawarra region.

2. In trying to control for external influences on physical activity during both trials the time frame of the follow-up surveys were matched as closely as possible in terms of daylight savings time and the time of day that the interviews were conducted. In doing this the planned 6-month follow-up survey in the NSW RCT was extended to an 8-month follow-up to ensure that the baseline and medium term follow-up data were collected under similar conditions. This ensured there were a similar number of daylight hours during the week prior to the survey interviews at baseline and the medium term follow-up. This factor was not a concern in the Illawarra RCT as the follow-up data was all collected during the Summer months including daylight savings time. However, this meant that the medium term follow-up periods were slightly different between the two trials, 6-months in Study I, the Illawarra RCT and 8-months in Study II, the NSW RCT. However, this should not have influenced the main findings.

3. An extension of the previous point surrounds the timing of the follow-up surveys. The follow-up time frame of both studies was to be around 6-months and as such it was inevitable there would be a change in season and climatic conditions during the course of the follow-up evaluations. This factor may have influenced the results. The Illawarra RCT began during Spring, which meant the

* The importance of the differences between the two trials with respect to environmental influences is discussed in Section 11.3 as a possible explanation the differences between the main findings of each trial.
2-month follow-up was conducted at the beginning of Summer and the 6-month follow-up was conducted during Autumn. The NSW RCT began in Autumn meaning the 2-month follow-up was conducted at the beginning of Winter and the 8-months follow-up conducted during Spring. The randomisation of study participants into the intervention and control groups in both trials to may have helped to even out the distribution of those participants who may have been motivated by seasonal differences to change their physical activity behaviour, but there was no way of controlling for these factors. Therefore, the two intervention trials were conducted over different times of the year, which may have inadvertently influenced physical activity patterns due to changes in seasonal and climatic conditions (see Section 11.3).

4. The age of the randomly selected samples were slightly different. This was beyond the control of the author of this thesis since the opportunity arose to link in with sample selection procedures, which were conveniently happening at the same time the present trials were planned. It was helpful to test the usefulness of the self-help print intervention in a larger age group in the NSW RCT, which was expanded beyond the age group targeted in the Illawarra RCT. The Illawarra RCT sample (which was linked to the IPAP data collection schedule) included participants aged between 40- and 60-years of age at baseline (see Section 5.2). Whereas, the NSW RCT sample which was linked to the ‘Active Australia’ campaign evaluation included participants aged between 18- and 75-years of age at baseline (see Section 8.2). This difference was partially accounted for by analysing the data collected from those participants aged between 40- and 60-years in the NSW RCT separately (see Appendix T).

5. There was no separate process evaluation telephone call conducted at 4 to 6 weeks after the self-help print intervention was sent to the participants in the NSW RCT, as was the case in the Illawarra RCT. The process call was omitted from the NSW RCT for a number of reasons discussed previously (see Section 8.5.1). Instead process evaluation of the self-help print intervention was conducted during the 2-month follow-up survey in the NSW RCT. Further consideration of these issues is presented in Section 11.2.
The differences noted between the two trials may help to explain the conflicting findings from the two trials. It appears that the NSW RCT may have been a more conservative test of the effectiveness of the self-help print intervention to promote physical activity to adults, given it was conducted using participants selected from a larger population base and in seasons not particularly conducive to physical activity. The implications of these factors and other related research findings are discussed in Section 11.3.

11.2 Was the intervention implementation successful?

The self-help print intervention booklets were specifically produced for the trials reported in this thesis. The booklets were considered to be 'state of the art' in terms of their content and the inclusion of Stage-based behavioural strategies. This is supported by the fact that they were developed in consultation with some of the world's leading researchers in the field of physical activity promotion. The booklets also underwent comprehensive evaluation with consumers similar to the target audience prior to being disseminated as part of the population-based intervention trials (see Section 3.3), were critically reviewed by physical activity research experts (see Section 3.2). Furthermore, the booklets were content analysed in terms of readability and comparability to previous stage-based print materials (see Sections 3.4, 3.5 and 3.6).

Process evaluation of the self-help print intervention revealed high recall and use of the booklets in both trials (see Section 6.5 and Section 9.5), with over 81% of the Illawarra and over 71% of the NSW samples recalling they received the 'Active Living' booklets in the mail up to 2-months after they were sent out. Furthermore, 87% of the Illawarra and 83% of the NSW participants who recalled receiving the booklets reported they had read them as well. These recognition and usability rates are comparatively high when judged against data reported by Bull et al. (1999) where only 68% of participants recalled receiving written materials 1-month after they were sent to them. Furthermore, only 39% had kept the materials in the trial conducted by

* Including the researcher best known for applying the Trantheoretical models’ Stages of Change to physical activity (B.H. Marcus, see Section 2.7.2 and Section 3.2).
Bull et al. (1999) compared with 82% of the Illawarra and 74% of the NSW participants in the present studies. Therefore, the method of delivering the self-help print intervention was indeed successful, both at the regional and state distribution levels and the materials themselves were well recognised and accepted by participants.

Sallis et al. (1989) suggested that a perceived lack of information might be directly related to the physical activity barrier cited as a lack of interest. This barrier may well be dismissed by distributing accurate information in quality theoretically guided self-help booklets, as print materials have been shown to have positive short-term effects on knowledge (Paul & Redman, 1997). Although it was anticipated that the ‘Active Living’ self-help print intervention materials evaluated in this thesis would provide a lot of information to a lot of people, it was expected that they would do much more than simply educate the receivers and that they might encourage actual behaviour change. The results of the Illawarra RCT provided some evidence to support this. The ‘Active Living’ booklets were indeed more successful than a simple public education resource as they seemed to prompt actual increases in reported physical activity in the short-term. It is difficult to determine why the materials were effective, as it may be due to a several reasons. It may be because their high quality professional production and content, or the fact they incorporated several behavioural change strategies shown to be effective in previous trials (see Section 2.9). Another more plausible reason that the booklets were successful was their theoretical background, as they were based on the Transtheoretical models’ Stages of Change. The theory behind the application of the Stages of Change to physical activity emphasises the importance of initially encouraging sedentary people to begin thinking about physical activity, then encouraging irregularly active people to adopt physical activity on a regular basis, and ultimately encouraging those who are already active to maintain an active lifestyle. However, the value of tailoring written physical activity advice to the Stages of Change remains uncertain (Bull et al., 1999). While the results of the Illawarra RCT suggest that the self-help print intervention based on the Stages of Change was successful in the short-term, other Australian trials have had limited success using tailored materials. For example, no significant change was reported in a sample of patients who volunteered to receive brief counseling on physical activity from their General Practitioner and were sent either tailored or standard physical activity advice in the form of a coloured pamphlet, as both worked equally well (Bull et al., 1999).
However, the authors conceded that the difference between the tailored and standard pamphlets may have been too slight and their results indeed supported the idea of written information as an effective supplementary intervention tool. Also contesting the positive short-term results of the Illawarra trial are the results of the second study conducted in this thesis, the NSW RCT. There were no significant changes observed in the NSW RCT at 2-months despite the NSW RCT using the same self-help print materials and disseminating them in the same way. However, there were some important differences between the Illawarra and NSW RCT’s that may help explain why one trial seemed more successful than the other (see Section 11.1). Another difference between the two trials which may account for some of the difference in results, was the removal of the process evaluation telephone call from the NSW RCT.

It has been suggested that sequential reminders or prompts (via telephone or mail) may serve as useful reminders to enhance the effects of an intervention (Owen et al., 1987). However, the process evaluation telephone call used in the Illawarra RCT conducted between the baseline and 2-month follow-up challenges this idea. While this telephone call was quite brief (lasting approximately 3- to 5-minutes), the process evaluation data collected during the 2-month follow-up showed that the process evaluation telephone call did not increase the recall or use of the intervention materials up to 2-months from what was reported during that first process evaluation (see Section 6.5.1). While the process evaluation telephone call was not intended to be part of the intervention strategy it remains an important point to consider, especially in light of the difference in results observed in the two trials conducted in this thesis. The additional telephone contact received by the intervention group in the Illawarra RCT may have had an additional impact on those participants who were contacted and influenced them to do more physical activity. However, the impact the process evaluation telephone call had on physical activity levels could not be determined, but should not be disregarded when interpreting the cumulative results of the two studies presented in this thesis.

Evidence to suggest the process evaluation telephone call may have had some intervention effect has been reported by Calfas et al. (1997) who suggested that an additional telephone contact participants received after a personal counselling session with a physician seemed to boost the effects generated from Project PACE. The telephone call administrated during project PACE, lasting approximately 10-minutes
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and was used as a follow-up reminder of a physician's counselling session. However, this telephone call also incorporated additional counselling on removing some of the barriers to physical activity that the participants were reporting (Calfas et al., 1997) and seemed more intensive than the telephone contact conducted in the present trial. The process evaluation call used in the Illawarra trial only offered information on trying to overcome the first barrier mentioned by the participant*. Like the present trial the evaluation methods used by Project PACE were not able to determine the isolated effects of the booster telephone call, but the authors suggested it may have been an effective method of reminding patients of the intervention, and that this method should be incorporated into future intervention programs (Calfas et al., 1997).

Hillsdon & Thorogood (1996) and Lombard et al. (1995) also supported the idea of brief telephone contact as a method of enhancing the adherence or maintenance of an intervention. However, Hellerstedt & Jeffrey (1997) suggested that while telephone administration of an intervention ensured the target recipient receives the intervention, it is more costly in terms of human resources and administration than comparable mail-based approaches. They also suggested that a target audience for minimalist mail-based interventions does exist, and has been quite a successful intervention used to assist people to lose weight (Hellerstedt & Jeffrey, 1997). Certainly the results of the Illawarra RCT support this notion at least in the short-term. Furthermore, given administration costs and training required to conduct these telephone calls, this strategy does not seem to be an efficient use of resources. This was one of the main reasons the process evaluation call was removed from the NSW RCT study design (see Section 8.5.1).

Another possible way of extending the intervention effects has been recently evaluated, which involved sequential mailings of self-help materials. Marcus, Bock et al. (1998) recently reported the results of a study where participants received several mailed reminders of a physical activity promotion program. Each participant was

* Not surprisingly the most commonly reported barrier was 'a lack of time' which is consistent with the literature on barriers to physical activity (Booth et al., 1995; Dishman, Sallis et al., 1985).
mailed several stage-based materials over the course of the study and ultimately reported significant increases in physical activity up to 6-months post baseline. Similar to the Illawarra RCT their results indicated positive short-term improvements in self-reported physical activity. However, unlike the Illawarra RCT their positive results were maintained up to the medium term (6-months; Marcus, Bock et al., 1998). Their study, therefore, highlights the potential of sequential mail-based reminders or prompts to enhance the effects of a self-help print intervention in a self-selected group of community volunteers. Nonetheless, the success of the study conducted by Marcus, Bock et al. (1998) clearly pointed out one reason why the positive short-term results of the Illawarra RCT may not have been effective in the medium term. Participants in the Illawarra RCT only received one mailing of the self-help intervention after baseline, and there was no other contact with participants other than the data collection points. Therefore, it would seem that multiple mailings of the materials might serve as useful reminders of the benefits of physical activity, reinforcing continued participation. However, this method may be too expensive for any population-based intervention, particularly in light of the lack of positive findings in the NSW RCT.

Therefore, based on the findings of the present trials, mail-based dissemination of the self-help print intervention materials could be argued to have been successful, as the materials were well received and used by the majority of participants in both trials. However, the optimal number of contacts (mail or otherwise) required to maintain or extend any intervention effects requires further investigation.

11.3 Was the self-help print intervention a successful physical activity promotion strategy?

It is unlikely that the differences in reported physical activity levels between the two study groups at the 2-month follow-up in the Illawarra RCT were due to anything other than the dissemination of the self-help print intervention. Consistent with randomisation process, the two study groups were similar in terms social and physical demographics as well as baseline physical activity levels at all three data collection points (see Section 6.1 and 7.2.1). Furthermore, background media influences, which may have had an earlier impact on physical activity levels, were monitored throughout the study and found to be similar between the two groups' at all three data collection periods (see Section 6.4 and section 9.4). Therefore, the differences between the two
groups self-reported walking and total physical activity observed at the 2-month follow-up in the Illawarra trial should be attributable to the fact that the intervention group were encouraged to participate in more physical activity by the self-help print intervention they received in the mail. While the self-help print intervention did not seem to promote sustained changes in physical activity (up to 6-months in the Illawarra RCT), it may be considered to be successful in the short-term. Additional strategies may need to be applied to ensure sustainable effects, such as those discussed in the previous section. Conversely, while the NSW RCT contained all the strengths associated with the Illawarra RCT, the results failed to support the use the ‘Active Living’ materials as a sole method of promoting increases in physical activity.

The lack of success observed in the NSW RCT is interesting, since similar interventions have all demonstrated at least short-term effects-albeit mostly in volunteer samples (Marcus, Bock et al., 1998; Marcus, Emmons et al., 1997; Cardinal & Sachs et al., 1996; Marcus, Banspach et al., 1992). However, apart from the Illawarra RCT, these previous trials have used closely controlled interventions, whereby participants have possibly felt compelled to change their behaviour, as they were involved in a research study. The use of volunteers may well provide overly positive conclusions about the efficacy of an intervention, as the participants are sufficiently motivated to volunteer for a program, and therefore, may have preconceived ideas of wanting to change their behaviour regardless of the intervention (King, 1994). Furthermore, the participants may have been recruited from a particular geographical area (i.e. close to the institution administering the study), as was the case in the Illawarra RCT. The personally addressed covering letter sent with the self-help intervention materials was printed on the local Universities letterhead* (see Appendix G). This may have unwittingly given the participants in the Illawarra RCT a sense of community involvement such that individual response was to try and act more favorably to the suggestions of the intervention itself. Compared to the NSW RCT, which included participants from across the entire State of NSW, who also received

* The centre of the Illawarra region is the city of Wollongong, where the local university is the University of Wollongong. The intervention was administered through this University because it was the institution where the author of this thesis was enrolled.
the same personally addressed letter printed on the University of Wollongong letterhead accompanying the intervention materials. Therefore, these participants may not have felt the same sense of local engagement with the intervention as those in the Illawarra RCT and as such dismissed the intervention materials as something they were not directly involved with.

Another consideration why the Illawarra RCT worked in the short-term and the NSW trial didn’t involves the effect of the surrounding environment on physical activity participation levels. In the last few years researchers have sought to understand the influences the physical environment has on physical activity levels and the choices people make (Owen, Leslie et al., in press). These authors point out that the 'time of year' may influence participation in physical activity as evidenced by Uitenbroek (1993) who reported that during Winter in Scotland, leisure time physical activity levels are greatly reduced when compared to the Summer level. Furthermore, Australian data has also implied a seasonal effect in a random sample of adults where fewer people were adequately active in Winter (57%) compared to Spring (60%) and Summer (63%; Lesjak & Bauman, 1998). In addition to this, Magnus et al. (1979), suggested that typical seasonal walkers suspend their activity during late Autumn and Winter, and begin again in Spring, making Spring the ideal time to promote physical activity. Interestingly then as the Illawarra RCT was initiated in Spring, this may have been the most opportune time for such a physical activity promotion strategy to be implemented. Hence, the potential of the self-help print intervention to have similar short-term success when initiated in Autumn (as was the case in the NSW RCT) may have been weakened by this seasonal effect, particularly since the 2-month follow-up was conducted during Winter - a time when many people may be resistant to the suggestion of being physically active. Nonetheless, the timing of the two trials conducted in this thesis was deliberate to compare the intervention across different seasons. Therefore, it would now appear that a more accurate comparison of the effectiveness of the self-help print intervention between the regional- and State-based implementation would have been to conduct both trials over the same seasons. It would also appear that to begin an intervention in Spring is more efficacious than to start it in Autumn.

Another possible explanation of why the self-help print intervention may have been more successful in the short-term in the Illawarra RCT and not in the NSW trial is
what has been termed the ‘coastal effect’. It has been suggested that individuals living on or near the coast enjoy better environmental conditions and surroundings which support an active lifestyle compared to those people living inland (Bauman et al., 1999). People living on the South East coast of NSW (which is where the Illawarra region is located) were found to be 27% more likely to be adequately active (even when controlled for other factors associated with physical activity levels, namely age, gender, country of birth, level of education and employment status). Bauman et al. (1999) suggest that the physical environment was a major influence on physical activity participation, as the coastal climate may offer more a supportive environment to be active in (Bauman et al., 1999). Hence, it may be that the Illawarra’s physical environment and locality maybe an important factor related to the success of the self-help intervention in the Illawarra over the diverse environmental conditions found across the State of NSW. Consequently it may be that minimal prompts and self-help information on a how to be more physically active may be more likely to be effective when delivered to people living in circumstances where there is a supportive environment and fewer barriers to physical activity.

One final possible reason why the main findings of both trials presented in this thesis are so different may be broadly related to the diversity of the sample evaluated in the NSW RCT. Insomuch, that all the similar interventions which have all demonstrated positive short-term effects (Marcus, Bock et al., 1998; Marcus, Emmons et al., 1997; Cardinal & Sachs et al., 1996; Marcus, Banspach et al., 1992) have been conducted in closed definable settings (ie., worksites or small community samples). The success generated from the self-help print intervention found in the Illawarra RCT may be the greatest effect we can expect when broadly disseminating this type of intervention and that going beyond a regional dissemination strategy limits the size of the effect that can be realistically produced.

An interesting finding in both trials was that the control groups also reported significant changes from their baseline levels. The control group only received the evaluation telephone calls, but these may have been enough to incite some intervention effect on these participants. Simply being in a study may motivate some people to act and the fact the surveys were all about how physically active the person was may have motivated them to do more physical activity. In the same instance this exposure to evaluation would equally affect the intervention group. All the
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Participants in the study may have also been influenced by the ‘Hawthorne Effect’ whereby the participants knowledge that they are involved in an experimental study may subconsciously effect their behaviour and or reporting of that behaviour in terms of perceived demand, evaluation anxiety and social desirability (Huck, Cormier & Bounds, 1974). These factors can all affect the information reported by the participants causing them to respond more favourably to the questions in the survey. Again these factors may equally affect the intervention and control group participants, but may explain why the control group also reported a similar pattern of behaviour over the course of the study. However, the added effects of the intervention should be apparent in a randomised controlled trial if indeed the intervention was effective.

It is difficult to conclusively determine the effectiveness of a self-help print intervention as a population-based intervention strategy to promote physical activity based on the cumulative findings of the two studies evaluated in this thesis. While it was intended that the NSW RCT study would be a replication of the Illawarra RCT, inherent differences between the two trials described here, make it difficult to draw accurate conclusions. It may be that the self-help print intervention may well be a cost effective method of promoting physical activity in regional communities and not at a State level, or that they are most effective when used in environments already supportive of physical activity. Therefore, it may be useful to examine the effectiveness of several regional trials being conducted from localised institutions, throughout the State of NSW before the final judgement is made.

11.4 Strengths of the trials described in this thesis

There were several strengths and unique qualities associated with the design, implementation and evaluation of the self-help print intervention presented in this thesis.

1. The self-help print intervention developed for this thesis was considered to be ‘state of the art’ in terms of its stage-based content and design. The materials were developed in consultation with leading physical activity researchers, and followed the theoretical basis of the Stages of Change to promote physical activity (see Section 3.2). The materials were also shown to be acceptable to the target audience during formative testing with consumers. In addition the booklets underwent content and readability analysis to test further test their
suitability for the target audience (see Section 3.3). Furthermore, process evaluation of the self-help print intervention materials in each trial revealed high recall and use of the ‘Active Living’ booklets during both trials (see Section 6.5 and Section 9.5), indicating that the dissemination methods used were successful.

2. The self-help print intervention was a novel way of moving away from an individualized prescriptive action-orientated approach to a more tailored but holistic approach to physical activity promotion. The ‘Active Living’ booklets included information suitable for individuals based on the Stages of Change. Tailoring physical activity advice to the Stages of Change made it possible for individuals to receive information specifically relevant to them. The booklets also allowed each individual participant the freedom to choose when, where and how they wanted to use the intervention and/or be physically active.

3. The dissemination method used in both trials was an innovative approach to administering the intervention. Previous trials have used initial face-to-face consultation to deliver the initial aspects of the intervention followed by internal mail delivery in work-sites (Cardinal & Sachs, 1996). The method of dissemination used in this thesis was specifically chosen because of its potential to be applied population-wide.

4. A major limitation reported in most previous studies, highlights an important strength of the present study. The use of volunteer participants is common in intervention studies. This approach to intervention organization, however, restricts the level of impact it can have on people who would not normally enroll in a research study. Hence, the potential of the intervention in the ‘real world is always speculative as results are based on a motivated sample and the intervention remains untested in the group who really need prompting by the intervention in the first place. Therefore, the results based on these volunteer samples are often a best-case scenario not generally representative of the results that may be achieved if the intervention was implemented in the population the volunteer samples are supposed to reflect. Participants in the present trials did not volunteer to be involved in the trials they merely consented to being re-
contacted and as such are the closer reflection of the population evaluated to date.

5. The pro-active random recruitment of participants ensured participants who agreed to be involved in the present trials were truly representative of the populations they were embody (see Sections 6.1 and Section 9.1). Furthermore, the random group allocation ensured the study groups were similar in terms of demographics and baseline physical activity levels as well (see Sections 6.3 and Section 9.3), which allowed accurate comparisons to be made between the two study groups over the duration of the study. Therefore, the results of the trials presented in this thesis provide a more accurate scientific reflection of the effect this type of self-help print intervention would have if broadly disseminated to the population.

6. Participants who were in least need of the self-help print intervention were excluded from the study*, ensuring resources where directed to where they were most needed. Furthermore, Sallis et al. (1999) expressed concerns about having already active participants enrolled in intervention studies, as it makes it harder to determine intervention effects. This indicates another strength in the present study since if the participants in Maintenance had been retained in the sample it may have been more difficult to detect any increases in reported physical activity.

7. A potential limitation typical of intervention studies is selection bias, which may be introduced by losing participants to follow-up†. This however, bias was minimised in the present study by the reasonably high response rates obtained in

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* These included participants who were in the M stage during the first two contacts (during sample selection) within each trial were considered to habitually active, hence they did not need the self-help print intervention, and were excluded from the studies (see Section 5.2 and Section 8.2).

† Another possible means of selection bias includes selective exclusion of people who do not have a telephone. Rates of telephone ownership are relatively high in Australia (with over 93% of households being having a telephone connection in 1985 (ABS, 1985). Nonetheless, these methods could selectively exclude Indigenous and some disadvantaged sections of the population.
both trials (see Section 6.2 and Section 9.2). Therefore, the attrition rates were low and the risk of the findings being biased negligible, which was another strength of the trials conducted in this thesis.

11.4.1 Specific strength of the NSW RCT

Apart from the strengths highlighted in Section 11.4, there was one main strength specifically associated with the NSW RCT. The NSW trial was one of few replication studies to be conducted in the area of physical activity promotion in whole populations. The replication study was important, as it was to enable the results of both trials to be considered when defining the overall effectiveness of the self-help print intervention as a method of physical activity promotion. Despite the differences between the two trials discussed in Section 11.1 both trials still made an important contribution to the understanding of how a self-help print intervention may be most effectively implemented. When considering the main findings of both trials, it seems that the self-help print intervention may be effective (in the short-term) when disseminated at a regional level, but its effectiveness is diminished when disseminated State-wide (see Section 11.6).

11.5 Limitations of the trials described in this thesis

Conducting and evaluating a mass distribution, low cost self-help print intervention is dependent upon some compromise in terms of study design and/or measurement (Owen & Lee, 1986). Therefore, although the methods used in this thesis were considered to be the most appropriate for the type of intervention studies being conducted (see Section 4.3), there were some limitations involved which need to be acknowledged when interpreting results.

1. The first limitation was that all data were collected via self-report, telephone interviews, which are susceptible to a number of biases, including sampling, intrusion recall, and social desirability biases, as well as over reporting (Vita & Owen, 1995). Although this method was considered the most appropriate to use in large community samples and these problems were partially overcome by using questions which had been previously shown to be valid and reliable (see Section 5.3 and Section 8.3). Furthermore, any measurement error should have been equally distributed between the intervention and control groups.
2. Another methodological concern is over-reporting due to social desirability bias*. However, in this thesis social desirability bias would be considered to equally affect all study groups. It was also minimised in the present thesis by using independent research assistants to conduct the telephone interviews at each follow-up. The participants in the study were therefore, not likely to develop a personal rapport with the interviewers as they would have been surveyed by a different interviewer at each follow-up. Hence the participants may have been less inclined to provide answers they perceived as socially desirable.

3. Another potential limitation of intervention research is the participants involvement in the studies, which may sub-consciously develop a need or desire to alter their behaviour simply because they are involved in a research study. This problem is especially highlighted when the initial increases in physical activity participation are short lived once the intervention is removed (Dishman, 1982). Unfortunately, the trials presented in this thesis are no exception, particularly when considering the moderate effects generated in the short-term one is forced to consider that the intervention effects observed may not have been a direct result of the intervention impact but were attributable to the simple support offered by being involved in a research study. However, the difference of the intervention group over and above the control group (who received the same contact with data collection officials throughout the trial) in the Illawarra trial partially overcomes this suggestion. Furthermore, as there was some maintenance of initial positive short-term (2-month) intervention effects extended to the medium term (6-months) in the Illawarra RCT, the intervention effects could be attributed to the self-help print intervention. This is further supported by the decline noted in the control group at 6-months.

4. Like most self-report data collection methods there was a trade-off between essential information required to evaluate the effects of the self-help print intervention and non-essential items to prevent the surveys from becoming too

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* Social desirability bias concerns participants reporting what they think the researchers want to hear instead of what they actually did or think (Bauman, 1987).
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long. Constructs of the Transtheoretical model were some of the items that were removed from the survey questionnaire (the processes of change, self efficacy and decisional balance). While the addition of these items may have created a more comprehensive view of the intervention effects their inclusion would have made the survey too long and less acceptable to the participants in terms of time and effort required to complete it (which may have compromised the good response rates obtained in these trials). Therefore, it is acknowledged that these factors may be important to the promotion and adoption of physical activity (through the Stages of Change) but it was beyond the scope of this thesis to evaluate all aspects of the Transtheoretical model.

5. Another limitation apparent in the data analysis strategies used was the multiple testing of the diverse physical activity measurements. Various categorical variables were created based on the raw physical activity prevalence estimates to categorise different interpretations of what constitutes adequate physical activity (specifically energy expenditure and stage change classifications). Multiple testing was conducted to tease out intervention effects based on different definitions of physical activity* (see Sections 5.8, Section 5.9 and Section 5.10), but similar effects were always observed.

6. The final limitation is that the results generated from the studies presented here may not be applicable to other populations or countries. Marcus and colleagues have conducted most of the physical activity Stage of Change research in the U.S, and this was one of the first studies of its kind to be conducted in Australia. While the results of the present trials may not be truly representative other Nationalities they can be used as guide.

7. While it is unrealistic to have a completely controlled environment in which to conduct an intervention trial both study samples may have been contaminated by back ground media and other physical activity promotional programs operating

* For this reason, Bonferroni adjustment (Altman, 1991) of the p values was not warranted for each outcome variable as they were considered to be separate analyses.
independent of the present intervention trials. Whilst attempts were made to monitor these factors and they were found to be equally recalled by the study groups in each trial (see Section 6.4 and Section 9.4), they may have had a subconscious, cumulative effect when the self-help intervention was applied. As mentioned this particular limitation was present in both trials, but may have been more of a factor in the Illawarra RCT where the Illawarra region was the site of a specific physical activity promotion program (Illawarra Physical Activity Project (IPAP), see Section 5.2). Consequently, the Illawarra community (and possibly the Illawarra RCT sample) had been previously introduced to the benefits of moderate physical activity, which may have precluded the impact potential of the self-help print intervention. Furthermore, as mentioned previously the Illawarra RCT study sample was recruited from a sample originally interviewed as part of the IPAP Benchmark survey. Although, it would nearly be impossible to find a truly unaffected community sample, greater effects may have been generated if the self-help print intervention had been evaluated in an uncontaminated regional community.

The NSW RCT may have also been contaminated, albeit to a lesser degree by the ‘Active Australia’ mass media campaign, which was conducted throughout NSW during late 1997 and 1998. NSW residents may have made changes to their physical activity routines in response to that media campaign, making it more difficult for the effects of the subsequent self-help print intervention to be recognised. Furthermore, as with the Illawarra RCT, the NSW study sample was recruited from a sample originally interviewed as part of the ongoing monitoring of the ‘Active Australia’ mass media campaign (see Section 8.2 and the Introduction to Chapter 10). However, it should be noted it would nearly be impossible to find a truly uncontaminated study sample in which to conduct a controlled community based intervention trial.

11.5.1 Specific limitation of the NSW RCT

Apart from the limitations presented in Section 11.5, there was one main limitation of the NSW RCT, which was ultimately one of its strengths as well. The sample was quite diverse as it included a wide variety of participants spanning five decades in terms of the age of the participants and numerous environmental
localities (rural, urban and coastal to name a few). The diversity of the sample therefore, may have made it more difficult to determine the effects of the self-help intervention. In fact this intervention strategy may have been more successful if targeting specific age groups (in terms of age brackets or lifespan changes corresponding to beginning or ending of natural life factors such as education, work, child rearing etc).

11.6 Final summary and conclusions

The self-help print intervention used in this study was designed based on the assumption that small increases in physical activity across large sections of the population would make a important contribution to improved overall health and well-being of the population. The flow on effect here would result in reduced health care costs associated with physical inactivity. Specifically these changes would be particularly important from a public health perspective, where even small increases in physical activity levels across a population would noticeably reduce the costs associated with lifestyle diseases such as Cardiovascular disease (Stephenson et al., 2000). Furthermore, it was recognised that small increases in physical activity at a moderate level is all that may be realistically expected when trying to encourage sedentary individuals to increase their physical activity participation in the real-world setting (Pratt et al., 1999).

Both trials reported in this thesis suffered from the usual complications associated with population-based research. The NSW RCT was designed as a replication of the Illawarra RCT. The aim of conducting a replication study was to allow more accurate conclusions to be drawn with regard to the effectiveness of the self-help print intervention as a method of promoting increases in physical activity across whole populations. However, the findings of the NSW RCT did not support those obtained in the Illawarra RCT, and suggested that the self-help print intervention was not a useful method of promoting increases in physical activity, even short-term, (up to 2-months) when disseminated State-wide. However, whilst the short-term increases in physical activity in the Illawarra trial could be considered clinically modest they are important from a public health perspective and suggest there was some benefit in implementing the intervention at a regional level.
Neither trial supported the role of the self-help print intervention as the sole method of promoting increased physical activity in the medium term (up to 6-months). Therefore, the results of the present thesis support the view expressed by Glasgow et al. (1983) who suggested that self-help interventions may be an effective way of getting people interested in behaviour change, but that more detailed ongoing support and training may be required thereafter to have lasting effects.

Further research needs to be conducted on self-help print interventions, as they remain a potentially useful method of reaching socially disadvantaged groups who would not normally have access to new forms of communication (Marcus, Owen et al., 1998), such as the Internet (Marcus et al., 2000). However, possible supplementary strategies that may compliment print interventions need to be explored in more detail such that future intervention studies can ensure longer lasting behaviour change. To this end, the value of the Transtheoretical model and the Stages of Change should not be underestimated in terms of enhancing our understanding of physical activity as a behaviour and defining intervention targets and strategies.

11.7 Recommendations for future research

It is important that research continues in search of effective population-based physical activity promotion strategies. It is especially important when considering that population estimates of leisure time physical activity have remained relatively unchanged in the U.S over the past decade (Pratt et al., 2000) and have actually decreased within Australia (Armstrong et al., 2000). These data (and the Illawarra cohort data presented in Appendix E) suggest that without specific intervention, physical activity participation levels will either remain unchanged or decrease in the future. Therefore, effective physical activity interventions suitable for population-wide dissemination are desperately needed. The following recommendations are offered as guidelines for future population-based physical activity intervention research.

1. The short-term success of the self-help print intervention demonstrated in the Illawarra RCT may have been more successful if supplemented by other strategies to generate greater long-term behaviour change. Other strategies may include; i. more personalised support techniques such as booster telephone calls; ii. use other reinforcement strategies, such as sending additional materials or
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reminder follow-ups in the mail; iii. the provision of links to specific services and physical activity programs operating in the community; iv. the offer of direct contact and physical assessments for those interested in doing more physical activity, or v. offering incentives for people changing their behaviour. Further evaluation of one or all of these supplementary strategies may be warranted.

2. Based on the different findings in the two trials presented in this thesis, an investigation into the potential of specific regional promotion campaigns using similar self-help materials distributed from a local institution or health promoting agency (as opposed a State-based dissemination strategy used in the NSW trial). In addition to this, further exploration of the role supportive physical activity encouraging environments plays in effectiveness of the self-help print materials.

3. Another important consideration requiring further investigation is the effects season has on physical activity participation. This research would have implications in terms of the best time to conduct intervention trials and promotional programs and for ensuring that prevalence data were collected during comparable conditions.

4. Another avenue worthy of exploration would be to determine most useful elements of current self-help interventions, in terms of what components elicit a response. It may be the increased awareness/education, or the morale-boosting effect of well-presented materials being personally sent to the individual or some other component of the booklet that evokes a response. Information pertaining to the successful components would help develop more effective interventions in the future.

5. In addition, further research into the most appropriate method of tailoring and personalising the information offered to individuals to make the information seem more relevant and which may increase the effectiveness of the intervention need to be investigated.

6. Further investigation of the most appropriate methods of delivering self-help intervention programs also needs to be considered, or appropriate combinations
of intervention strategies (e.g., mail administered with ongoing telephone support). In addition to this the possibility of a similar self-help intervention being administered through the World Wide Web and the use of computer assisted interactive interventions (Marcus et al., 2000). Prochaska & Velicer (1997) have suggested that computer expert systems may outperform non-interactive written material by at least 5%, which would be a clinically significant result. While, these expert systems are limited to individuals who have access to a computer (Ashworth, 1997) they have shown promise because of the convenience and flexibility of the systems as well as the interactive nature of the application (Fotheringham et al., 2000).

7. In addition, evaluation of more broad-based intervention strategies suitable for whole populations needs to be conducted. Including establishing more opportunities for physical activity within the environment via the provision of more spaces conducive to participation in planned and incidental physical activity.

8. As well, more community-wide longitudinal studies need to be conducted with people who have established an active lifestyle, so that interventionists can learn from what helps these people remain motivated to be active. Once learned, strategies may be developed and applied to promote physical activity to the sedentary people in society.
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Population-based
Randomised Controlled Trials
to Promote Physical Activity using a
Self-help Print Intervention

by

Alison L. Marshall BSc (Hons)

The second volume of a thesis submitted
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Appendix A

Key constructs of the Transtheoretical model
A.1 Processes of Change

The Processes of Change are another key component of the Transtheoretical model. Each Process of Change is either a cognitive or behavioural strategy that may be used by people to assist them to change their behaviour. The Processes of Change were derived from the multiple number of techniques and methods traditionally associated with the theoretical derivations of the Transtheoretical model (Prochaska & Velicer, 1997). Prochaska et al. (1988) conducted extensive validity and reliability studies on the Processes of Change and as such they have been shown to be predictors of change in both self-changers and those engaged in therapy. Although Prochaska et al. (1992) revealed self-changers could use up to 130 techniques to quit smoking all of these techniques used could be summarised into the 10 Processes of Change (Prochaska et al., 1988).

The 10 Processes of Change are;

1. **Consciousness raising:** seeking new evidence to increase awareness of causes, consequences and cures for a problem behaviour. Consciousness raising involves increasing the information available for the person to make an informed decision about wanting to change their lifestyle (Prochaska & DiClemente, 1982).

2. **Self-re-evaluation:** emotional and cognitive reappraisal of one’s self image and values with respect to the problem behaviour

3. **Dramatic relief:** using emotional experiences associated with the problem behaviour to find solutions

4. **Social liberation:** both the belief that one can change and the commitment to do act on ones belief

5. **Environmental re-evaluation:** combines both affective and cognitive appraisals of how the presence or absence of the problem behaviour affects ones social and physical environment

6. **Counter conditioning:** learning of and substituting alternate behaviours to counter act the problem behaviour

7. **Self-liberation:** choice and commitment to change, including the belief that change is possible
8. **Stimulus control**: removal of cues, taking control of situations and causes of the problem behaviour and replacing with positive cues

9. **Reinforcement management**: changing the contingencies that control or maintain a sedentary lifestyle, by rewarding self and from others for making change

10. **Helping relationships**: utilising support from others during attempts to change

The Processes of Change are also inter-related with the Stages of Change (DiClemente et al., 1991; Norcross et al., 1991; Prochaska & DiClemente, 1984; Prochaska & DiClemente, 1983). However, the relationship between the Stages and Processes of Change varies between each Stage.

In addition the Processes of Change can be further divided into two groups, the Behavioural and Cognitive Processes (Marcus, Rossi et al., 1992). People in the early Stages of Change tend to use the Cognitive processes to a larger extent compared to those in the latter Stages of Change who tend to use the Behavioural processes more. Pre-contemplators do not seem to use any of the processes very much at all, but this is consistent with their non-perception of a problem behaviour. Whereas, when individuals move into Contemplation they begin to use the cognitive processes, including consciousness raising, dramatic relief and environmental re-evaluation. Contemplators are generally more receptive to the problem and how it may affect them (Marcus, Rossi et al., 1992). As people move into Preparation they begin to re-evaluate themselves until they decide to take Action where they then begin to use the Process of self-liberation to gain will power and the belief in their own ability to change (see Section A.3). Moving from Action to Maintenance requires careful preparation and constant attention to the Processes of Change in particular the behaviour processes such as reinforcement management, helping relationships, counter conditioning and stimulus control, which are all very important processes during Maintenance (Prochaska & DiClemente, 1992; Marcus, Rossi et al. 1992).

Research on the Stages and Processes of Change as they relate to physical activity promotion was pioneered by Marcus, Rossi et al. (1992). The usefulness of the Processes of Change in enhancing physical activity adoption and maintenance was evaluated in a 6-month study using 314 subjects (66% female, mean age 41 years) from two work-sites (Marcus et al., 1996). After the 6-month follow-up four patterns of physical activity status emerged; adoption of activity (26%), relapse from activity
(15%); stable sedentary (32%) and stable active (27%). The adopters displayed an increase in their use of the Processes of Change, whereas relapsers demonstrated a decrease in their use of the Processes of Change, and those who remained stable did not alter their use of the Processes of Change (Marcus et al., 1996). More specifically differences between Stages showed that those people who were classified as stable active reported using all ten Processes of Change. For the adopters use all but one (self liberation) of the Processes of Change increased in use from baseline and for the relapsers all five behavioural processes decreased in use from baseline but there was also significant decrease in the use of the cognitive process ‘dramatic relief’.

Significant associations between achieving the CDC/ACSM criterion for physical activity and the use of the Processes of Change* were reported after involvement in a 6-month randomised clinical trial (Dunn, Marcus et al., 1997). Subjects involved in an educational lifestyle physical activity program significantly used the behavioural Processes of Change to facilitate an increase in physical activity levels. In particular the counter conditioning, helping relationships, reinforcement management and self-liberation processes were utilised ($p < 0.05$; Dunn, Marcus et al., 1997). While these Processes were useful mediators of change in this trial it is important to note that the trial involved weekly meetings and educating the participants on how and when to use the Processes to help them. Therefore, it may be that the Processes of Change are useful tools when reinforcement training is also available, but not so important when a minimal approach is used.

In summary the use of the Processes of Change depends on the persons Stage of Change with those people in the early stages using the cognitive processes more than those in the later Stages of Change. Therefore, it would appear that including the Processes of Change into an intervention designed using the Stages of Change would be a useful strategy to help move people between stages (Marcus et al., 1996; see Section 3.6).

### A.2 Decisional balance

Reflects how an individual sees the costs (cons) and benefits (pros) of changing their problem behaviour. Research across 12 problem behaviours (smoking, cocaine, weight, dietary fat, safe sex, condom use, exercise, sun screen, radon testing, Measured by the Marcus, Rossi et al. (1992) 40-item instrument.
Appendix A

delinquency reduction, mammography and physicians practising preventive medicine) has shown the two factors of decisional balance, namely the pros and cons were remarkably stable (Prochaska & Velicer, 1997). Insomuch, that in all 12 problem behaviours the pros of changing are lower than the cons of the behaviour for those in Pre-contemplation and as individuals moved into Contemplation the perceived pros increased but the cons remain relatively unchanged. Furthermore, as individuals progressed to Action from Contemplation the pros of the behaviour change increased and the cons decreased and in fact in 10 of the 12 studies the pros were in fact higher than the cons in the Action stage (the exceptions were smoking and cocaine quitting). Hence, the cross over in the pros and cons occurs somewhere in Preparation.

Therefore, when planning an intervention based on the Stages of Change, some basic rules apply to the use of decisional balance. To ensure progression through the Stages of Change, the pros of change must increase between Pre-contemplation, to Contemplation to Action, and to progress from Contemplation to Action the cons must decrease. Hence, for people in Pre-contemplation targeting the pros of change is the first step, until the person is firmly in Contemplation then the cons of change should be addressed. Progression into Action is initiated when the pros outweigh the cons, and the individual is well prepared to take Action.

A.3 Self efficacy

Self-efficacy is the specific confidence in one's ability to cope with high-risk situations without relapsing into old behaviours (Bandura, 1977). This construct was integrated from Bandura's Social Cognitive theory (Prochaska & Velicer, 1997). Self-efficacy and decisional balance can both be used to categorise the Stages of Change. Individuals who have no intention of becoming physically active (Pre-contemplators) have lower self-efficacy beliefs than those who have recently begun physical activity (Prochaska & Velicer, 1997). Similarly individuals who do not intend on changing their behaviour perceive that the costs of activity far outweigh the expected benefits. Therefore, interventionists can work on increasing one's self-efficacy in those people who are in the early Stages of Change, to enable them to feel more positively about initiating a physical activity program.
Appendix B

Items used for the focus groups
B.1  Focus group invitational letter

FREE LUNCH

Well nothing is entirely FREE, we would like your opinion on a new brochure we are producing for people just like YOU.

The brochures have a theme of “Active Living” and we would like your opinion on what they look like, what they have in them and how they appeal to you.

While you enjoy your healthy lunch with 8-10 others we will discuss the brochure in a friendly relaxed setting, so have your say!!!

If you would like to be involved in this valuable piece of research and development please call Alison on 21 3881 or leave a your name and phone number with the secretary.
B.2 Focus group recruitment advertisements in local newspapers

FREE LUNCH
Adults aged 40-60 yrs wanted for discussion group on health. For more info call Alison on 213881 at the Uni of Wollongong.

ILLAWARRA MERCURY, Saturday, August 23, 1997 — 67

FREE LUNCH
Adults aged 40-60 years wanted for discussion group on health. For more info call Alison on 213881 at the Uni of Wollongong.

THE ADVERTISER; Wednesday, August 27, 1997 — 29
B.3 Focus group covering letter for booklet evaluation

University of Wollongong

25th August 1997

Participants name

Address

Suburb, postcode

Dear Participants Name,

Thank you for volunteering to be involved in the evaluation of some new and exciting brochures.

Please find enclosed the Brochure, titled "Active Living - keeping in step"

I would appreciate it if you could read this brochure before you come to lunch on Tuesday 26th August 1997 and record any comments on a piece of paper.

Please bring the brochure with you to the lunch so we can refer to it.

Remember the lunch starts at 12:30 pm and goes to 1:30 pm at the Wollongong City Council Building, Level 10, Committee Room 2.

I will look forward to seeing you there.

Yours sincerely

Alison Miners

PhD Student University of Wollongong
National Heart Foundation Research Officer
B.4 Focus group information sheet and informed consent form

University of Wollongong
Department of Biomedical Science

SUBJECT INFORMATION PACKAGE

A. PROJECT TITLE

Effects of a Stage Based Minimal Intervention on Stage Status and Physical Activity Levels of Adults Aged 40 to 60 Years: Evaluation of the Stage Based Materials.

B. PROJECT OBJECTIVES

The purpose of this study is to evaluate the content, appearance and acceptability of some written materials with the target population, before the final draft is printed and sent out for the main study.

C. EVALUATION PROCEDURE

Evaluation will involve a group of eight to ten people (plus the principle investigator) getting together in a room to discuss the content, appearance and acceptability of some written materials. The investigator will ask the group questions about the written materials and each member of the group should give their honest opinion in response. To help with data collection peoples voices will be recorded through out the session. However, individual voices will not be identified when reporting the data. If at anytime you would like to say something off the record the tape recording can be turned off and turned back on at an appropriate time.

At the end of the discussion information will be collected on individual activity levels and demographics to aid in reporting of the data as group averages. To ensure confidentiality names will not be recorded on the written data collection sheets. Once the tape recordings have been analysed the tapes and any other data recordings will be kept in a locked cupboard.
Appendix B

The written materials are being developed with the assistance of the National Heart Foundation and are to be used as part of another larger study to promote physical activity.

D. RISKS AND DISCOMFORTS

This evaluation does not require you to overexert yourself in any way. There is no form of deception involved in this study. Therefore, there are minimal risks involved.

E. ENQUIRIES

Any questions concerning the procedures and/or rationale used in this investigation are welcome at any time. Please ask for an explanation if at any point you do not fully understand, or if you feel the point is not clarified to your satisfaction. The initial contact person is the investigator Alison Miners (phone (042) 21-3881). Subsequent enquires may be directed to Dr Linda Tapsell (Supervising Lecturer, Department of Biomedical Science, University of Wollongong; phone (042) 21-3881). Any enquiries regarding the conduct of this investigation may be directed to the Secretary of the University of Wollongong Human Research Ethics Committee on (042) 21-4457.

F. FREEDOM OF CONSENT

Participation in this evaluation is entirely on a voluntary basis. You are free to deny consent before or during the experiment. In the latter case such withdrawal of consent should be performed at the time you specify, and not at the end of a particular trial. Your participation and/or withdrawal of consent will not influence your present and/or future involvement with the University of Wollongong. You have the right to withdraw consent at any time during the experiment, and this right shall be preserved over and above the goals of the research.

G. CONFIDENTIALITY

All questions, answers and results of this study shall be treated with absolute confidentiality. Subjects will only be identified in the resultant manuscripts, reports or publications by the use of subject codes and/or group averages.
University of Wollongong  
Department of Biomedical Science  
INFORMED CONSENT FORM  
Effects of a Stage Based Minimal Intervention on Stage Status and Physical Activity Levels of Adults Aged 40 to 60 Years: Evaluation of the Stage Based Materials.

The researchers conducting this project support the principles governing both the ethical conduct of research, and the protection of the interests, comforts and safety of the subjects at all times. This form and the accompanying Subject Information Package are given to you for your own protection. They contain a detailed outline of the experimental procedures, and the possible risks. Your signature below indicates the following six things:

1. You have received the Subject Information Package;  
2. You have read and understood its contents;  
3. You have been given the opportunity to discuss the contents with one of the researchers prior to commencing this experiment;  
4. You clearly understand the procedures and the possible risks;  
5. You voluntarily agree to participate in the project; and  
6. You are free to withdraw consent and discontinue participation at any time without penalty or jeopardising your involvement with the University of Wollongong.

Any concerns, complaints or further suggestions may be directed initially to the investigator conducting this study, Alison Miners (phone (042) - 21-3881). Subsequent enquiries can be directed to Dr Linda Tapsell (Supervisor, Department of Biomedical Science, University of Wollongong: phone (042) 21-3881), or Dr Mark Brown (Acting Head, Department of Biomedical Science, University of Wollongong: phone (042) 21-3881). Any enquiries regarding the conduct of this experiment may be directed to the secretary of the University of Wollongong Human Research Ethics Committee on (042) 21-4457.

I freely and voluntarily agree to fully participate as a subject in the study titled 'Effects of a Stage Based Minimal Intervention on Stage Status and Physical Activity Levels of Adults Aged 40 to 60 Years: Evaluation of the Stage Based Materials'.

Surname: ___________________________ Given Names: ___________________________

Address:________________________________________________________________________

____________________________________________________________________________________

Phone: _________________________________

Signature: ___________________________ Date: ______ / ______ / ______

Witness Name: ______________________ Signature: ___________________________
B.5 Focus group questions

Focus group questions to pilot test the active living booklets

1. What do you remember about the brochure you read?
   What did you like the most about it?
   What didn’t you like about it?

2. What did you think was the main message in the brochure?
   Was there anything hard to understand or confusing?

3. How was the information in the brochure useful for someone like you?
   Would you like to comment on its overall acceptability to most people?
   What do you think of the stories about the people in the brochure?

4. What did you think of the look of the brochure?
   Can you comment on its readability?
   Was there anything annoying or off-putting about it?
   What do you think of the photographs?

5. Now I would like to talk about the brochure as it would exist in a set of four brochures. After reading the brochure you were given can you comment on your needs for further information?
   Did you feel inspired to seek more information?

6. Do you have any other comments or recommendations as to how the brochures could be improved?
   The look?
   The colour?
   The content?
B.6 Focus group participant questionnaire

Focus Group Participant Questionnaire

Age: _______  Sex: male / female  Postcode at home: _______

Occupation: __________________________  Job status: full time / part time / retired

Main Language spoken at home: ________________________________

Highest level of education: ________________________________

1. On your own rate the booklet you read in relation to these various factors:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interesting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not interesting</td>
</tr>
<tr>
<td>Encouraging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Discouraging</td>
</tr>
<tr>
<td>Too short</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Too long</td>
</tr>
<tr>
<td>Informative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not informative</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not practical</td>
</tr>
</tbody>
</table>

2. In the last two weeks, how much time have you spent walking for recreation, exercise or to get to or from places for at least 10 minutes consecutively?

__________ minutes

__________ hours

3. In the last two weeks, how much time have you spent doing vigorous exercise which made you breathe harder or puff and pant? (eg., football, tennis-singles, netball, squash, athletics, jogging, keep-fit classes and vigorous swimming)

__________ minutes

__________ hours

4. In the last two weeks, how much time have you spent doing any other leisure time physical activities that you haven’t mentioned? (eg., more moderate activities such as lawn bowls, gardening and sailing)

__________ minutes

__________ hours
The following questions are about your participation in physical activities over the LAST SIX MONTHS

5. In the last six months, how much time did you spend each week, on average, walking for recreation, exercise or to get to or from places for at least 10 minutes consecutively?

__________ minutes

__________ hours

6. In the last six months, how much time did you spend each week, on average, doing vigorous exercise which made you breathe harder or puff and pant? (eg., football, tennis-singles, netball, squash, athletics, jogging, keep-fit classes and vigorous swimming)

__________ minutes

__________ hours

7. In the last six months, how much time did you spend each week, on average, doing any other leisure time physical activities that you haven't mentioned? (eg., more moderate activities such as lawn bowls, gardening and sailing)

__________ minutes

__________ hours

8. The following statements are about the amount of physical activity you INTEND to do in the near future. Please choose the statement which best describes how you feel at present.

☐ I DO NOT INTEND to be more active than I have been over the last 2 weeks.

☐ I INTEND to become more active over the next month than I have been over the last two weeks.

☐ I INTEND to become more active sometime over the next six months than I have been over the last 2 weeks.
Appendix C

Self-help print intervention booklets
Appendix D

Preliminary notice of intending survey
29 August, 1997

Participants name
Address
Suburb, postcode

Dear Participants Name,

Preliminary Notice of Intending Survey

The Department of Biomedical Science at the University of Wollongong and the National Heart Foundation are working together to help prevent heart disease in the Wollongong area and we would like you to be involved.

Your name was selected from a list of names given to the National Heart Foundation by the Hunter Valley Research Foundation. You agreed to being re-contacted after participating in a physical activity survey, which was conducted by the Hunter Valley Research Foundation on behalf of the National Heart Foundation in 1995.

We would like to invite you to be involved in a similar survey. This survey is being conducted by Ms Alison Miners (PhD Student, Department of Biomedical Science, University of Wollongong), Associate Professor Adrian Bauman (University of New South Wales) and Dr Linda Tapsell (University of Wollongong). The study is supported by the National Heart Foundation and aims to collect information regarding the health of Wollongong adults.

The survey we are proposing will ask questions related to your current physical activity/exercise participation. The survey will be administered to you by telephone and should only take about five minutes to complete. The answers that are provided by those involved in the survey will be treated confidentially and your name will not be kept with your answers. Please answer honestly and tell us about your current physical activity.

You are under no obligation to participate in this survey. If you do not want to be involved or have any questions about the survey please telephone or write to Ms Alison Miners 21 3881 as soon as possible. If you have no objection to being telephoned and surveyed please do nothing and expect a telephone call within the next two weeks. Please note that if you are telephoned but you do not want to be involved you are free refuse at anytime.

Further to the above mentioned survey you may receive a brochure in the mail and/or be recontacted in two and six months to participate in follow-up surveys. If you have any further enquiries about the conduct of this survey please contact the Secretary of the University of Wollongong Human Research Ethics Committee on 21 4457.

Thank you for your time.

Yours sincerely,

Alison Miners
PhD Student University of Wollongong
National Heart Foundation Research Officer
Appendix E

Illawarra cohort results
E.1 Introduction

The Illawarra cohort consisted of respondents to the 1995 IPAP Benchmark survey who consented to being re-contacted. Respondents were re-conducted in September 1997, thereby, establishing a 2-year natural history cohort. The aim of the cohort analysis was to establish the natural trend in physical activity trends over the previous 2-years, and to determine any impact of the Illawarra Physical Activity Project (IPAP). Details of the sample section, survey instrument, methods and response rate, as well as the representativeness of the Illawarra cohort were presented in Sections 5.2, 6.1 and 6.2.

E.2 Background media message recall and impact

Despite a 3.2% increase in media message recall within the Illawarra cohort between 1995 and 1997, the difference was not statistically significant ($\chi^2=1.86; p = 0.17$; see Figure E.1).

![Figure E.1: Proportion of the Illawarra cohort who recalled a health related message in 1995 and 1997](image)

The evaluation of unprompted recall of physical activity and health related messages at baseline and the 2-year follow-up showed that more messages regarding physical activity and health were recalled during the 2-year follow-up (77%) than at baseline (36%; Yates Corrected $\chi^2 = 45.4, p > 0.001$; see shaded section of Table E.1). Therefore, it would seem that the themes associated with the IPAP mass-media campaign were more frequently recalled at the 2-year follow-up survey.
### Table E.1: Unprompted message recall by the Illawarra cohort at baseline and the 2-year follow-up

<table>
<thead>
<tr>
<th>Message recall</th>
<th>baseline n=456</th>
<th>2-year follow-up n=480</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Exercise for Health</td>
<td>95 (20.9)</td>
<td>151 (31.5)</td>
</tr>
<tr>
<td>Specific Campaign ‘no ifs...no buts’</td>
<td>-</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Specific Campaign ‘Active Over 50’s’</td>
<td>-</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Exercise and Heart</td>
<td>19 (3.1)</td>
<td>90 (18.8)</td>
</tr>
<tr>
<td>Exercise and Diet</td>
<td>27 (5.9)</td>
<td>45 (8.8)</td>
</tr>
<tr>
<td>Exercise and Smoking</td>
<td>4 (0.9)</td>
<td>9 (1.9)</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>17 (3.7)</td>
<td>73 (15.2)</td>
</tr>
<tr>
<td>General Health</td>
<td>18 (4.0)</td>
<td>23 (4.8)</td>
</tr>
<tr>
<td>Diet</td>
<td>14 (3.1)</td>
<td>14 (2.9)</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>26 (5.7)</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>34 (7.5)</td>
<td>7 (1.5)</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>10 (2.2)</td>
<td>14 (2.9)</td>
</tr>
<tr>
<td>Community Events</td>
<td>11 (2.4)</td>
<td>4 (0.8)</td>
</tr>
<tr>
<td>Smoking</td>
<td>8 (1.8)</td>
<td>17 (3.5)</td>
</tr>
<tr>
<td>Can’t Recall</td>
<td>124 (27.3)</td>
<td>27 (5.6)</td>
</tr>
<tr>
<td>Other</td>
<td>48 (10.5)</td>
<td>6 (1.4)</td>
</tr>
</tbody>
</table>

#### E.3 Changes in physical activity participation

There was a 4% increase in the number of respondents reporting that they walked for recreation and exercise between 1995 (56%) and 1997 (60%). However, this increase did not translate into increase in overall walking prevalence over the 2-years (see Table E.2).

The reverse was observed in the results of reported participation in moderate physical activity which displayed an overall 4% decrease between 1995 (65%) and 1997 (61%). This decrease was mainly due to the fact females reported a 4% decrease in their participation in moderate physical activity, resulting in a statistically significant decrease in mean moderate physical activity prevalence between 1995 and 1997 of 24 minutes a week (see Table E.2).

Interestingly participation in vigorous physical activity increased by 4% between 1995 (29%) and 1997 (33%). This increase may have been facilitated by a 10% increase in males reporting participating in vigorous physical activity in 1997. This
increase translated into a significant increase in mean vigorous physical activity prevalence between 1995 and 1997 of over 14 minutes a week (see Table E.2).

Table E.2: Mean reported time (hrs) spent being physically active in the past week in 1995 and 1997 in the Illawarra cohort

<table>
<thead>
<tr>
<th>Physical activity (hours/week)</th>
<th>1995 mean ± SD (n=760)</th>
<th>1997 mean ± SD (n=760)</th>
<th>t-value (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>2.13 ± 2.99</td>
<td>1.90 ± 2.47</td>
<td>1.90 (0.06)</td>
</tr>
<tr>
<td>moderate</td>
<td>2.32 ± 3.44</td>
<td>1.92 ± 3.01</td>
<td>2.93 (0.003)*</td>
</tr>
<tr>
<td>vigorous</td>
<td>0.88 ± 2.07</td>
<td>1.12 ± 2.65</td>
<td>-2.28 (0.02)*</td>
</tr>
<tr>
<td>total</td>
<td>5.33 ± 5.09</td>
<td>4.95 ± 4.82</td>
<td>1.90 (0.06)</td>
</tr>
</tbody>
</table>

As there was no change in total walking time, an increase in vigorous intensity physical activity time and a decrease in moderate intensity physical activity time there was no significant change in total physical activity time between 1995 and 1997 (see Table E.2). Therefore, it would seem that without specific targeted intervention the natural phenomenon with total physical activity prevalence is to remain the unchanged.

This was also reflected in the types of vigorous and moderate activities undertaken by the sample in 1995 and 1997. Of the 1995 sample 237 respondents reported participating in at least one vigorous activity. The most frequently reported activities were tennis/squash, closely followed by attending the gym (see Table E.3). Slightly more respondents reported participating in vigorous activity in the 1997 survey (n=249), but the most frequently reported activities remained similar. There were however, slight differences in the number of respondents reporting each activity, there were decreases in the number reporting tennis/squash and swimming and increases in the number reporting heavy domestic duties between the surveys.

Of the 1995 sample 501 respondents reported participating in at least one moderate activity. The most frequently reported activities were gardening and domestic duties, closely followed by golf (see Table E.4). Fewer respondents reported participating in moderate activity in the 1997 survey (n=463), but the most frequently reported activities remained similar. There were however, slight differences in the number of respondents reporting each activity, there were decreases in the number reporting
mowing the lawn and domestic duties and slight increases in gym and exercise classes between the surveys.

Table E.3: Most frequently reported vigorous physical activities in 1995 and 1997 by the Illawarra cohort

<table>
<thead>
<tr>
<th>Vigorous physical activity</th>
<th>1995 (n=237) %</th>
<th>1997 (n=249) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennis/Squash</td>
<td>25.7</td>
<td>19.7</td>
</tr>
<tr>
<td>Swimming</td>
<td>17.7</td>
<td>8.0</td>
</tr>
<tr>
<td>Gym/Aerobics</td>
<td>22.3</td>
<td>18.1</td>
</tr>
<tr>
<td>Heavy domestic</td>
<td>4.6</td>
<td>16.9</td>
</tr>
<tr>
<td>Exercise Machine</td>
<td>2.0</td>
<td>4.8</td>
</tr>
<tr>
<td>Dancing</td>
<td>3.8</td>
<td>5.2</td>
</tr>
<tr>
<td>Cycling</td>
<td>12.7</td>
<td>10.8</td>
</tr>
<tr>
<td>Jogging</td>
<td>10.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Team Sports</td>
<td>13.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Golf/Bushwalking</td>
<td>0</td>
<td>10.0</td>
</tr>
<tr>
<td>Vigorous intensity Hobbies</td>
<td>6.8</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Table E.4: Most frequently reported moderate physical activities in 1995 and 1997 by the Illawarra cohort

<table>
<thead>
<tr>
<th>Moderate physical activity</th>
<th>1995 (n=501) %</th>
<th>1997 (n=463) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gardening</td>
<td>73.3</td>
<td>71.5</td>
</tr>
<tr>
<td>Mowing Lawn</td>
<td>12.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Gym/Aerobics</td>
<td>&lt;1.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Domestic Duties</td>
<td>12.4</td>
<td>9.7</td>
</tr>
<tr>
<td>Dancing</td>
<td>1.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Bowls</td>
<td>3.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Yoga/Tai Chi</td>
<td>1.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Golf</td>
<td>8.2</td>
<td>9.1</td>
</tr>
<tr>
<td>Swimming</td>
<td>3.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Cycling</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Other</td>
<td>1.6</td>
<td>5.4</td>
</tr>
</tbody>
</table>
E.4 Proportion meeting a 150-minute per week criterion of sufficient physical activity at baseline and 2-years

Over half of the sample were participating in more than 150-minutes of physical activity per week at prior to the baseline survey (62% see Table E.5). An additional 3% were participating in at least 150-minutes of physical activity per week at the 2-year follow-up survey, but the difference between the two surveys periods as not significant. Furthermore, there was no significant difference between the number of people in each category changing categories over the study period (McNemars $X^2 (1, n = 760) = 1.67, p = 0.20$).

Table E.5: Proportion of sample participating in at least 150-minutes of physical activity per week in 1995 and 1997 in the Illawarra cohort

<table>
<thead>
<tr>
<th></th>
<th>2-years n (%)</th>
<th>baseline n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td>&lt; 150-minutes</td>
</tr>
<tr>
<td>≥ 150-minutes</td>
<td>361 (48)</td>
<td>130 (17)</td>
</tr>
<tr>
<td>&lt; 150-minutes</td>
<td>109 (14)</td>
<td>160 (21)</td>
</tr>
<tr>
<td>totals</td>
<td>470 (62)</td>
<td>290 (38)</td>
</tr>
</tbody>
</table>

E.5 Energy expenditure analysis

There were similar proportions categorised in each of the four energy expenditure categories at baseline and 2-years (see Table E.6).

Table E.6: Energy expenditure categories in 1995 and 1997 in the Illawarra cohort

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>1995</th>
<th>1997</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>High</td>
<td>141 (18.6)</td>
<td>158 (20.8)</td>
</tr>
<tr>
<td>Moderate</td>
<td>327 (43.0)</td>
<td>289 (38.0)</td>
</tr>
<tr>
<td>Low</td>
<td>231 (30.4)</td>
<td>239 (31.4)</td>
</tr>
<tr>
<td>Nil</td>
<td>61 (8.0)</td>
<td>74 (9.7)</td>
</tr>
</tbody>
</table>

At baseline over half the sample (62%) were shown to expend ‘adequate’ amounts of energy through physical activity (see Table E.7). However, in the 1997 follow-up the proportion of respondents reporting adequate amounts of physical activity decreased to 59%. However, there was no significant difference between the number
of people in each category changing categories over the study period (McNemar's $X^2$ 
$(1, n = 760) = 1.65, p = 0.20$).

Table E.7: Proportion of sample expending an adequate or inadequate
amount of energy from physical activity in 1995 and 1997 in the
Illawarra cohort

<table>
<thead>
<tr>
<th>baseline n (%)</th>
<th>2-years n (%)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>adequate</td>
<td>inadequate</td>
<td>totals</td>
</tr>
<tr>
<td>adequate</td>
<td>336 (44)</td>
<td>132 (17)</td>
<td>468 (62)</td>
</tr>
<tr>
<td>inadequate</td>
<td>111 (15)</td>
<td>181 (24)</td>
<td>292 (28)</td>
</tr>
<tr>
<td>totals</td>
<td>447 (59)</td>
<td>313 (41)</td>
<td></td>
</tr>
</tbody>
</table>

E.6 Changes in physical activity prevalence over 2-years

The analyses in this section were based on changes in respondents’ physical activity
status over the 2-year study period based on baseline physical activity participation.
Firstly, any amount of change in each of the three separate activities (walking, moderate
and vigorous activity) were analysed separately, then total physical activity
status was analysed (see Table E.8).

Table E.8: Changes in physical activity participation reported by
respondents in the Illawarra cohort between 1995 and 1997

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>Increased activity*</th>
<th>Remained stable#</th>
<th>Decreased activity§</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>walking</td>
<td>320 (42.1)</td>
<td>114 (15.0)</td>
<td>326 (42.9)</td>
</tr>
<tr>
<td>moderate</td>
<td>250 (32.9)</td>
<td>172 (22.8)</td>
<td>338 (44.3)</td>
</tr>
<tr>
<td>vigorous</td>
<td>171 (22.5)</td>
<td>174 (54.6)</td>
<td>415 (22.9)</td>
</tr>
<tr>
<td>total</td>
<td>342 (45.0)</td>
<td>30 (3.9)</td>
<td>388 (51.1)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by any amount
# reported physical activity stayed the same
§ reported physical activity decreased by any amount

The cohort demonstrated a greater proportion of respondents across all three physical
activity categories decreased their activity levels over the 2-year follow-up period.
This difference carried through to the total physical activity category, whereby over
51% of the sample decreased their total physical activity prevalence by any amount.
E.6.1 Participants who reported at least a 1-hour increase in total physical activity between baseline and the 2-year follow-up

This section focuses on respondents who increased their activity prevalence by at least 1-hour or more over the 2-year period, and those respondents who decreased their activity prevalence by at least 1-hour or more. Again individual activity states, walking, moderate, and vigorous activity, as well as total activity prevalence were analysed.

This analysis also demonstrated that more of the sample decreased their walking, moderate intensity and total physical activity prevalence by 1-hour than increased it by 1-hour. However, more of the sample increased their vigorous activity by 1-hour, than decreased it by 1-hour (see Table E.9).

Table E.9: Proportion of Illawarra cohort respondents who reported at least a 1-hour change in reported physical activity between 1995 and 1997

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>Increased 1-hour* n (%)</th>
<th>Within 1-hour# n (%)</th>
<th>Decreased 1-hour§ n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>175 (23.1)</td>
<td>388 (51.1)</td>
<td>197 (25.9)</td>
</tr>
<tr>
<td>moderate</td>
<td>174 (22.9)</td>
<td>343 (45.1)</td>
<td>243 (32.0)</td>
</tr>
<tr>
<td>vigorous</td>
<td>123 (16.2)</td>
<td>520 (68.4)</td>
<td>117 (15.4)</td>
</tr>
<tr>
<td>total</td>
<td>260 (34.2)</td>
<td>192 (45.3)</td>
<td>308 (40.5)</td>
</tr>
</tbody>
</table>

* reported at least a 1-hour increase in physical activity
# reported physical activity remained within 1-hour
§ reported at least a 1-hour decrease in physical activity

Regardless over 34% of the sample increased their total physical activity level by at least 1-hour. Backward logistic regression was conducted to determine if there were any predictors for increasing total physical activity by at least 1-hour. The variables entered into the model coded into dichotomous values were gender (male and female), marital status (those married or in a defacto relationship and those single or widowed), language spoken at home (those who speak English at home and other languages), Age (<50 years and ≥50 years), children living at

* 1-hour was chosen as the cut off for increases or decreases in activity prevalence, as it seemed a long enough time period for a subject to have planned to increase their activity by in a 1-week period.
home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded trichotomously were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), baseline activity level (<135-minutes per week, ≥135 to 360-minutes per week and ≥360-minutes per week); (Model Fit; \(X^2 = 57.9, p < 0.001\) (-2 log likelihood = 835.8); see Table E.10).

Table E.10: Predictors of adopting at least 1-hour more physical activity per week in the Illawarra cohort between 1995 and 1997

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (&lt;50-years)</td>
<td>-0.29</td>
<td>0.17</td>
<td>0.09</td>
<td>0.75 (0.54-1.04)</td>
</tr>
<tr>
<td>age (≥50-years)</td>
<td>0.44</td>
<td>0.19</td>
<td>0.02</td>
<td>1.55 (1.07-2.25)</td>
</tr>
<tr>
<td>baseline activity (&lt;2.25 hrs/wk)</td>
<td>1.54</td>
<td>0.22</td>
<td>0.00</td>
<td>4.68 (3.03-7.18)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention \((p = 0.2)\); gender \((p = 0.5)\); marital status \((p = 0.3)\); child at home \((p = 1.0)\); employment status \((p = 0.6)\); language spoken at home \((p = 0.2)\) and education \((p = 0.6)\).

The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-years in the Illawarra cohort was; i. baseline activity level, whereby those participants who were already active at least 2.25 hours per week more likely to report at least 1-hour more at the 2-year follow up compared to those less active at baseline. The odds ratio for this increased as activity level increased above 6-hours per week (see Table E.10).

**E.6.1.1 Participants who reported at least a 1-hour increase in total physical activity between baseline and the 2-year follow-up categorised by energy expenditure**

Further investigation of the 1-hour change data was undertaken in terms of inadequate baseline activity as depicted by inadequate energy expenditure. Therefore, respondents who were adequately active at baseline were compared to those respondents who were inadequately active at baseline. This analysis was important since it is the inadequately active people who need to be
targeted in interventions' as they are the ones most likely to suffer from the ill effects of an inactive lifestyle. These data indicated that 45% of the inadequately active baseline participants increased their total physical activity by at least 1-hour between baseline and the 2-year follow-up (see Table E.11).

Table E.11: At least a 1-hour activity increase in reported physical activity per week between 1995 and 1997, categorised by adequate energy expenditure in the Illawarra cohort

<table>
<thead>
<tr>
<th>baseline energy expenditure category</th>
<th>increased activity ≥1-hour n (%)</th>
<th>activity level stayed same or decreased n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate (n = 468)</td>
<td>130 (28)</td>
<td>338 (72)</td>
</tr>
<tr>
<td>inadequate (n = 292)</td>
<td>130 (45)</td>
<td>162 (56)</td>
</tr>
</tbody>
</table>

There was, however, a statistically significant difference between the inadequately active respondents and the adequately active respondents who increased their total physical activity prevalence by at least 1-hour (Yates corrected $X^2=21.66; p < 0.001$). The odds ratio for this result indicated that the inadequately active group were 2.56 times (95% CI 1.84-3.55) more likely to increase their activity status by at least 1-hour than the adequately active group.

Backward step-wise logistic regression was conducted on the data to determine if there were any predictors for increasing total physical activity by at least 1-hour over the previous 2-years. The same variables were entered into the model as were reported in Section E.6.1. The variables retained in the model were language spoken at home, baseline intention and baseline physical activity level (Model Fit; $X^2 = 13.8, p = 0.02$ (-2 log likelihood = 365.9) but none were independently significant predictors (see Table E.12).

Variables coded into dichotomous values and entered into the model as follows, gender (male and female), marital status (those married or in a defacto relationship and those single or widowed), language spoken at home (those who speak English at home and other languages), age (<50 years and ≥50 years), children living at home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded trichotomously were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), baseline activity (<30-minutes per week, ≥30 to 104-minutes per week and ≥104-minutes per week).
Table E.12: Predictors of adopting at least 1-hour more physical activity per week between 1995 and 1997 in the inadequately active Illawarra cohort baseline sample categorised by energy expenditure category

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>language (English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>1.18</td>
<td>0.68</td>
<td>0.08</td>
<td>3.27 (0.86-12.34)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>-0.49</td>
<td>0.31</td>
<td>0.10</td>
<td>0.61 (0.33-1.12)</td>
</tr>
<tr>
<td>baseline intention (next 6-months)</td>
<td>0.23</td>
<td>0.31</td>
<td>0.47</td>
<td>1.25 (0.69-2.31)</td>
</tr>
<tr>
<td>baseline activity (&lt;0.50 hrs/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥0.50 – 1.74 hrs/wk)</td>
<td>-0.37</td>
<td>0.31</td>
<td>0.23</td>
<td>0.69 (0.38-1.28)</td>
</tr>
<tr>
<td>baseline activity (≥1.75 hrs/wk)</td>
<td>0.27</td>
<td>0.33</td>
<td>0.41</td>
<td>1.31 (0.69-2.50)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.8); marital status (p = 0.2); age (p = 0.6); child at home (p = 0.8); employment status (p = 0.6); and education (p = 0.8).

E.7 Stage of Change analysis

Similar proportions of respondents presented in each of the Stages of Change at baseline and the 2-year follow-up, indicating very little stage movement (see Table E.13).

Table E.13: Stages of Change for the Illawarra cohort in 1995 and 1997

<table>
<thead>
<tr>
<th>Stage</th>
<th>baseline n (%)</th>
<th>2 year follow-up n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>59 (8)</td>
<td>61 (8)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>94 (13)</td>
<td>113 (15)</td>
</tr>
<tr>
<td>Preparation</td>
<td>104 (14)</td>
<td>118 (16)</td>
</tr>
<tr>
<td>Action</td>
<td>65 (9)</td>
<td>59 (8)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>402 (53)</td>
<td>388 (51)</td>
</tr>
<tr>
<td>Relapse</td>
<td>31 (4)</td>
<td>19 (3)</td>
</tr>
</tbody>
</table>

There was no significant difference between the mean paired Stage of Change data at baseline (3.93 ± 1.40) and the 2-year follow-up (3.83 ± 1.41; t = 1.65, p = 0.10; note: the participants staged in the relapse stage were removed from the analysis). This is consistent with the non-significant changes in self-report physical activity data reported in Section E.3. Nonetheless to investigate stage further, changes in the
Stage of Change model in line with categories suggested by Marcus, Simkin et al. (1996; see Figure E.2).

Figure E.2: Stage change as indicated by progression, stability or regression through the Stages of Change over the 2-year follow-up of the Illawarra cohort

The majority of the respondents remained stable over the 2-year period and of those remaining more actually relapsed than progressed their Stage of Change (see Figure E.2). These data indicate that without specific intervention individuals Stage of Change will naturally remain relatively unchanged.

Stage change data were also examined, where more specific movement from the inactive stages (PC, C & P) to the active stages (A or M) were compared (see Table E.14). There was no significant movement between stage categories (McNemars $X^2 = 1.50; p = 0.22$).

Table E.14: Categorical stage change from the inactive stages (PC, C & P) to the active stages (A or M) in the Illawarra cohort (n=707) between 1995 and 1997

<table>
<thead>
<tr>
<th>baseline</th>
<th>2-year follow-up*</th>
<th>2-year follow-up*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A &amp; M</td>
<td>PC, C &amp; P</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>95 (13)</td>
<td>152 (22)</td>
</tr>
<tr>
<td>A &amp; M</td>
<td>336 (48)</td>
<td>124 (18)</td>
</tr>
</tbody>
</table>

*the relapse stage was moved from the analysis
Appendix E

An alternated method of analysing stage change, examines more specifically movement from the sedentary stages (PC & C) to the more active stages (P, A or M; see Table E.15). There was not quite a significant difference observed between stage category movement between baseline and 2-year, where the majority of participants remained stable in P, A and M (McNemars $X^2 = 3.58; p = 0.06$).

Table E.15: Categorical stage change from the sedentary stages (PC & C) to the more active stages (P, A or M) in the Illawarra cohort (n=707) between 1995 and 1997

<table>
<thead>
<tr>
<th>baseline</th>
<th>2-year follow-up*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>77 (11)</td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>466 (66)</td>
</tr>
</tbody>
</table>

*Relapse stage moved from analysis

E.8 Conclusion

Based on the results it would seem there was little to no change in the participants followed in the Illawarra cohort in terms of self-reported physical activity or Stage of Change between 1995 and 1997. This is an important finding in that it suggests that the natural tendency is for physical activity levels to remain relatively unchanged if there is no specific intervention implemented targeting individuals.
Appendix F

Illawarra RCT survey instrument
1 Introduction

This coding manual contains the codes used during the 1997 Physical Activity Survey conducted for the National Heart Foundation and the Department of Bio-medical Science at the University of Wollongong by the Hunter Valley Research Foundation. The survey was conducted by telephone between 3 and 12 September, 1997.

Contacts for the survey were generated from the results to a similar survey conducted in November 1995. During the 1995 survey, respondents were asked if they would be prepared to participate in further research. The 1997 survey attempted contact with the group of people who had indicated that they would participate in further research. The re-contact list contained the respondent's name, contact telephone number and home address.

The methods used during the 1997 survey were similar to that used in 1995. Attempts at contacting each respondent were made between the hours of 11 am and 8.30 pm, Monday to Friday. However, despite the extended hours, most interviewing was completed between 3 pm and 8.30 pm. The most constructive interviewing times were Monday, Tuesday and Wednesday evenings. When contact with a household was achieved, the Computer Aided Telephone Interviewing (CATI) system prompted the interviewer to ask for the respondent by name. If the respondent was not at home, or not available at that time, a further five call attempts were made. There were many instances where the total of six call attempts was exceeded. In these instances, the respondent had been confirmed as living within the household, yet was unavailable at the times when the call attempts had been made.

Extra procedures were used when the respondent had moved since the 1995 survey. Interviewers were instructed to first ask the new occupants if they had a forwarding telephone number for the respondent. If this avenue was not successful, interviewers were instructed to use other means of identifying the respondent's new telephone number. In cases where the respondent rented the premises, contact was made with the real estate agent managing the property to try and obtain the new telephone number.

* There were only slight variations to the content of the 2- and 6-month follow-up surveys, including the addition of the self-help print intervention process evaluation questions (see Appendix I) and the removal of the weight question (Q.24 in baseline survey) in the 2-month survey. The weight question was again added in to the 6-month survey.
There are two databases, which are described in this manual. The first is called RRATE.DBF. This database contains the record of every call attempt throughout the survey. However, it does not contain the record of contacts with real estate agents during course of the survey. Please note that this database does not contain any results from the interviews.

The second database is called RESULTS.DBF. This data base contains the results to every completed interview. Furthermore, the names and addresses of people who have agreed to participate in further research are included in this data base. Therefore its contents should be kept secure.

2 Response rate

<table>
<thead>
<tr>
<th>Content:</th>
<th>Response rate code for each call attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codes used:</td>
<td>1 Completed interview</td>
</tr>
<tr>
<td></td>
<td>2 Refusal</td>
</tr>
<tr>
<td></td>
<td>3 Terminated interview</td>
</tr>
<tr>
<td></td>
<td>4 Call back</td>
</tr>
<tr>
<td></td>
<td>5 Not answering</td>
</tr>
<tr>
<td></td>
<td>6 Unsuitable</td>
</tr>
<tr>
<td></td>
<td>7 Answering machine</td>
</tr>
<tr>
<td></td>
<td>8 Person moved - possible leads being followed</td>
</tr>
<tr>
<td></td>
<td>9 Business</td>
</tr>
<tr>
<td></td>
<td>10 Disconnected</td>
</tr>
<tr>
<td></td>
<td>11 Engaged</td>
</tr>
<tr>
<td></td>
<td>12 Fax</td>
</tr>
<tr>
<td></td>
<td>14 Language problem</td>
</tr>
<tr>
<td></td>
<td>17 Call back - incomplete interview</td>
</tr>
<tr>
<td></td>
<td>22 Refusal - household</td>
</tr>
<tr>
<td></td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>44 Call back - household</td>
</tr>
<tr>
<td></td>
<td>66 Unavailable for survey period</td>
</tr>
</tbody>
</table>

3 Interview

"Good morning/afternoon. May I please speak to "CATI inserts respondent's name""

[IF NO] Is there a time that I can call back to speak to ..[RESPONDENT]

[IF NO AGAIN - PERSIST: EXPLAIN WHO YOU ARE AND WHY YOU ARE CALLING]

'... [RESPONDENT] gave us his/her name and should be expecting this call.'

'... so is there a time when I can call back to speak to him/her?'

[IF RESPONDENT HAS MOVED, ENTER 8 AND TRY TO GET PHONE NO./ADDRESS/CONTACT]

[IF REFUSAL] 'Thank you for your time. Goodbye.'

[WHEN RESPONDENT IS SPEAKING]

Hello, My name is ____________ from the Hunter Valley Research Foundation.

We are conducting a survey for the National Heart Foundation and the Department of Biomedical Science at the University of Wollongong. We obtained your name from a list of people who agreed to being recontacted after a survey by the National Heart Foundation in late 1995.

You should have received a letter in the mail about this survey. Did you receive this letter last week?
I am sorry that you haven't received it. Could I tell you what is in the letter now, so that you can decide whether you would like to be involved in the survey?

If respondent is doubtful about doing the interview because the letter was not received, give him/her the telephone number of Alison Miner at Wollongong University tel. (042) 21 3881...or offer to arrange for another letter to be sent.

"Would you like me to send you another letter?"

If this is accepted enter 8. Check the address and correct if necessary. Arrange a callback time allowing at least 5 days for letter delivery.

LETTER SUMMARY
The letter explains that the National Heart Foundation and the Department of Biomedical Science at the University of Wollongong are working together to help to prevent heart disease in the Wollongong area.

When you took part in a physical activity survey in 1995, you gave your name and address to the National Heart Foundation. The survey we are conducting is similar to the 1995 survey, but shorter. It will only take about 10 minutes of your time.

As before, the survey will ask about your current physical activity. All your answers will be treated as confidential and this data will not be kept with your name and address. If there are any questions you prefer not to answer you can just tell me to move to the next question.

Will you help us with this survey?

If yes, thank you [PROCEED WITH SURVEY]

Since you did receive the letter (and we haven't heard from you), I'm calling you to complete the survey about physical activity.

The survey is being conducted so that we can determine current physical activity levels and should not take much more than ten minutes to complete.

Will you help us with this survey?

If yes, thank you [PROCEED WITH SURVEY, over the page]
The first 3 questions relate to walking as a means of transport eg walking to & from the shops or work.

Q1: In the past 2 weeks, how many times did you walk specifically as a means of transport to get to or from places for 10 minutes or more continuously.

Field content: 
Number of times
99 = Don't know

Skip: if Q1 = 0 then go to Q4

Q2: How long would you estimate you spent walking in this way in the past two weeks?

Field content: 
Number of minutes
77 = Don't know

Number of hours
777 = Don't know

Note: This question was only asked if Q1 greater than 0.

Q3: And when you walked specifically as a means of transport, did you usually walk .... [READ OPTIONS 1 TO 4]

Field content:
1 = Not at all vigorously
2 = A little vigorously
3 = Moderately
4 = Very vigorously.
5 = Varies/depends
6 = Don't know

The next 3 questions relate to walking purely for recreation, health or fitness.

Q4: Apart from walking as a means of transport, in the past 2 weeks, how many times did you walk purely for recreation, health or fitness.

Field content: 
Number of times
99 = Don't know

Skip: if Q4=0 go to Q7

Q5: How long would you estimate you spent walking in this way in the past two weeks.

Field content: 
Number of minutes
77 = Don't know

Number of hours
777 = Don't know

Note: This question was only asked if Q4 greater than 0.

Q6: And when you walked purely for recreation or fitness, did you usually walk ....READ OPTIONS 1 TO 4

Field content:
1 = Not at all vigorously
2 = A little vigorously
3 = Moderately
4 = Very vigorously.
5 = Varies/depends
6 = Don't know
Q7: In the last 2 weeks, did you do any vigorous exercise which made you breathe harder or puff and pant? (e.g. football, tennis, netball, squash, athletics, jogging, keep fit exercises, vigorous swimming).

Field content:  
1 = Yes  
2 = No

Skip: if Q7 = 2 go to Q12

Q8: Which 2 vigorous activities did you spend most time doing in the past two weeks?

Field content: Name of first activity  
Field content: Name of second activity

Skip: if Q8A AND Q8B = 0 (i.e. no activities listed) go to Q12

Q9: In the past 2 weeks, how many times did you do / play Activity 1?

Field content: Number of times  
99 = Don't know

Q10: In the past two weeks how long would you estimate you spent doing/playing Activity 1.

Field content: Number of minutes  
77 = Don't know  
Number of hours  
777 = Don't know

Q11: And did you do/play Activity 1 [READ OPTIONS 1 TO 4]

Field content:  
1 = Not at all vigorously  
2 = A little vigorously  
3 = Moderately  
4 = Very vigorously  
5 = Varies/depends  
6 = Don't know

Skip: If Activity 2 = 0 (i.e. no second activity) go to Q12

Q9b: In the past 2 weeks, how many times did you do/play Activity 2?

Field content: Number of times  
99 = Don't know

Q10b: In the past two weeks how long would you estimate you spent doing/playing Activity 2?

Field content: Number of minutes  
77 = Don't know  
Number of hours  
777 = Don't know

Q11b: Did you do/play Activity 2 [READ OPTIONS 1 TO 4]

Field content:  
1 = Not at all vigorously  
2 = A little vigorously  
3 = Moderately  
4 = Very vigorously.
Q12: In the last 2 weeks did you do any other leisure time physical activities that you haven’t already mentioned (e.g. more moderate activities such as lawn bowls, gardening and sailing?)

Field content:  
1 = Yes  
2 = No

Skip: if Q12 = 2 go to Q18AM

Q13a: Which 2 moderate activities did you spend most time doing in the past two weeks?

Field content: Name of first activity  
Field content: Name of second activity

Skip: if Q13A = 0 AND Q13B=0 go to Q18AM

Q14a: In the past 2 weeks, how many times did you do / play {moderate} Activity 1

Field content: Number of times  
99 = Don’t know

Q15a: In the past two weeks how long would you estimate you spent doing/playing {moderate} Activity 1?

Field content: Number of minutes  
Field content: Number of hours  
77 = Don’t know  
777 = Don’t know

Q16a: And did you do/play {moderate} Activity 1

Field content:  
1 = Not at all vigorously  
2 = A little vigorously  
3 = Moderately  
4 = Very vigorously.  
5 = Varies/depends  
6 = Don’t know

Skip: if Q13B  = 0 goto Q18AM

Q 14b: In the past 2 weeks, how many times did you do/play {moderate} Activity 2?

Field content: Number of times  
99 = Don’t know

Q15b: In the past two weeks how long would you estimate you spent doing/playing {moderate} Activity 2?

Field content: Number of minutes  
Field content: Number of hours  
77 = Don’t know  
777 = Don’t know

Q16b: And did you do/play {moderate} Activity 2

Field content:  
1 = Not at all vigorously  
2 = A little vigorously
Appendix F

3 = Moderately
4 = Very vigorously.
5 = Varies/depends
6 = Don't know

The following questions are about your participation in physical activities over the LAST SIX MONTHS.

Q18: In the last six months how much time did you spend each week, on average, walking for recreation, exercise or to get to or from places?

Field content: Number of minutes  Field content: Number of hours
77 = Don't know  777 = Don't know

Q18b: In the past six months, how much time did you spend each week, on average, doing vigorous exercise which made you breathe harder or puff and pant? (e.g. football, tennis, netball, squash, athletics, jogging, keep fit exercises and vigorous swimming)

Field content: Number of minutes  Field content: Number of hours
77 = Don't know  777 = Don't know

Q18c: In the past six months, how much time did you spend each week, on average, doing any other leisure-time physical activities that you haven't mentioned (e.g. more moderate activities such as lawn bowls, gardening and sailing)?

Field content: Number of minutes  Field content: Number of hours
77 = Don't know  777 = Don't know

Q19: The following statements are about the amount of physical activity you INTEND to do in the near future. Which one best describes how you feel at present.

Field content: 1 = I DO NOT INTEND to be more active than I have been over the last two weeks.
2 = I INTEND to become more active over the next month than I have been over the last 2 weeks.
3 = I INTEND to become more active sometime over the next six months than I have been over the last two weeks.
4 = Don't know

Skips: if Q19 = 1 OR Q19 = 4
if Q19 = 2 ask Q20a
If Q19 = 3 ask Q20b

Q 20a: What kind of activity do you MAINLY INTEND to do in the next month?
Q 20b: What kind of activity do you MAINLY INTEND to do in the next six months?

Field content: 1 = Walking?
2 = Moderate activities like lawn bowls, gardening and sailing?
3 = Vigorous activities like jogging, football, singles-tennis netball, squash, athletics, keep-fit classes, vigorous swimming?
4 = Haven't thought about it
9 = Don't know

Skip: if Q20>3 go to Q21

43
Q21: How OFTEN do you intend to do this activity

Field content:

1 = Once a day
2 = 4-5 times a week
3 = 2-3 times a week
4 = Once a week
5 = Haven't thought about it
9 = Don't know

The following question is about experiences that can affect activity habits. Think about each item and rate how frequently the event occurs.

Q22: How frequently does each of the following experiences occur within your lifestyle?
These statements were randomised.

Q22P1 You put things around your home to remind you of exercising.
Q22P2 You tell yourself if you try hard enough you can keep exercising.
Q22P3 You react emotionally to warnings about an inactive lifestyle.
Q22P4 When you exercise you tell yourself that you are being good to yourself by taking good care of your body.
Q22P5 You are aware of more and more people encouraging you to exercise these days.
Q22P6 You have someone who provides feedback about your exercising.
Q22P7 You look for information related to exercise.
Q22P8 You realise that you might be able to influence others to be healthier if you exercised more.
Q22P9 You get frustrated with yourself if you don't exercise.
Q22P10 When you are feeling tense you find exercise is a great way to relieve your worries.

Field content:

1 = Never
2 = Seldom
3 = Occasionally
4 = Often
5 = Repeatedly
9 = Don't know

Q23: Would you say the amount of physical activity you currently do is ...

Field content:

1 = Too much
2 = Enough to benefit your health
3 = Not enough to benefit your health
4 = I do none at all

Q24: What is your approximate weight in pounds and stones, or kilograms?

Field content: Stones

77 = Don't know
Min = 4 stone
Max = 50 stone

Field content: Pounds

777 = Don't know
Min = 600 lbs
Max = 50 stone

Field content: Kilograms

777 = Don't know
Min = 20 kilograms
Max = 200 kilograms
The following question relates to any reasons why you may be UNABLE to be physically active.

Q25: Do you have a short or long term injury or disability, or any other physical condition that limits your level of physical activity?

Field content: 1 = Yes  
2 = No

Q25b: If yes, please specify:

Field content: Name of disability

Q26: Have you heard or seen any messages about physical activity and health in the media WITHIN THE PAST MONTH?

Field content: 1 = Yes  
2 = No  
3 = Not sure

Q26b: [IF YES] What was the main message?

Field content: Description of main message

Q27: Have you seen any brochures which encourage you to be more physically active WITHIN THE LAST MONTH?

Field content: 1 = Yes  
2 = No

Q27b: [IF YES] What and where?

Field content: Brochures seen by respondent

Q28: Would you be willing to participate in a similar survey in the future and possibly receive some printed material about physical activity in the mail?

Field content: 1 = Yes  
2 = No

Skip: if Q28 = 2 go to end of survey

Q29: Have you changed your mailing address? (since our last survey in Sept '95)

[IF ADDRESS NOT VOLUNTEERED - READ CURRENT ADDRESS DETAILS]
Appendix G

Self-help print intervention letters
G.1 A copy of the covering letter sent to the Pre-contemplation participants

University of Wollongong

Department of Biomedical Science

University of Wollongong
NSW 2522 Australia

Tel (042) 21 3881
Fax (042) 21 4096
International 61 42+
http://www.uow.edu.au

22 September 1997

Dear title surname,

Thank you for participating in the survey interview we conducted earlier this month with the help of the Hunter Valley Research Foundation. As an important part of this new and exciting program we are conducting with the help of the National Heart Foundation, we would like you to accept and use these booklets.

The booklets have the main heading “Active Living” and they are about becoming more physically active. Each booklet has been designed to help people just like you to start thinking about moderate physical activity.

As you can see we have sent you four booklets, but we would like you to start reading the Purple booklet, titled Active Living - Have you heard the good news?

This booklet is designed to help you start thinking about the benefits of moderate physical activity.

How to make this booklet work for you:
- read the booklet a couple of times,
- write in the booklet,
- underline the parts that really mean something you,
- mark the pages you would like to return to quickly, and
- when you think you are ready to know more about moderate physical activity read the next booklet in the series.

The next booklet in the series is, Active Living - Are you ready?

Use the four booklets as stepping stones to learning more about the benefits of active living and maybe consider adding some physical activity into your lifestyle.

If you have any questions or would like more information on ways to be active in the Illawarra please phone the National Heart Foundation Illawarra Physical Activity Project Office on (02) 4275 1066.

Yours sincerely,

Alison Miners
National Heart Foundation Research Officer
PhD Student University of Wollongong.
G.2 A copy of the covering letter sent to the Contemplation participants

University of Wollongong

22 September 1997

Dear title surname,

Thank you for participating in the survey interview we conducted earlier this month with the help of the Hunter Valley Research Foundation. As an important part of this new and exciting program we are conducting with the help of the National Heart Foundation, we would like you to accept and use these booklets.

The booklets have the main heading "Active Living" and they are about becoming more physically active. Each booklet has been designed to help people just like you to gain confidence in yourself and your ability to become moderately physically active.

As you can see we have sent you three booklets, but we would like you to start reading the [Green booklet, titled Active Living - Are you ready?]

This booklet is designed to help you make moderate physical activity a part of your lifestyle.

How to make this booklet work for you:

- read the booklet a couple of times,
- write in the booklet,
- underline the parts that really mean something to you,
- mark the pages you would like to return to quickly, and
- when you think you are ready to learn more about including some moderate physical activity into your lifestyle read the next booklet in the series.

The next booklet in the series

Use the three booklets as stepping stones to learn more about the benefits of active living and how you can add more physical activity into your day.

If you have any questions or would like more information on ways to be active in the Illawarra please phone the National Heart Foundation Illawarra Physical Activity Project Office on (02) 4275 1066.

Yours sincerely,

Alison Miners
National Heart Foundation Research Officer
PhD Student University of Wollongong.
Appendix G

G.3 A copy of the covering letter sent to the Preparation participants

University of Wollongong

22 September 1997

Dear title surname,

Thank you for participating in the survey interview we conducted earlier this month with the help of the Hunter Valley Research Foundation. As an important part of this new and exciting program we are conducting with the help of the National Heart Foundation we would like you to accept and use these booklets.

The booklets have the main heading “Active Living” and they are about becoming more physically active. Each booklet has been designed to help people just like you to gain confidence in yourself and your ability to participate in regular moderate physical activity.

As you can see we have sent you two booklets, but we would like you to start reading the booklet titled Active Living - Take the step!

This booklet is designed to help you make moderate physical activity a regular part of your day.

How to make this booklet work for you:

- read the booklet a couple of times,
- write in the booklet,
- underline the parts that really mean something you,
- mark the pages you would like to return to quickly, and
- when you think you are ready make physical activity a regular part of your lifestyle read the next booklet in the series.

The next booklet in the series is; Active Living - Keep in step!

Use the two booklets as stepping stones, to learn more about the benefits of active living and how to make physical activity a regular part of your day.

If you have any questions or would like more information on ways to be active in the Illawarra please phone the National Heart Foundation Illawarra Physical Activity Project Office on (02) 4275 1066.

Yours sincerely,

Alison Miners
National Heart Foundation Research Officer
PhD Student University of Wollongong.
Appendix G

G.4 A copy of the covering letter sent to the Action & Maintenance participants

University of Wollongong

Department of Biomedical Science

University of Wollongong
NSW 2522 Australia
Tel (042) 21 3881
Fax (042) 21 4096
International 61 42+
http://www.uow.edu.au

22 September 1997

Dear title surname,

Thank you for participating in the survey interview we conducted earlier this month with the help of the Hunter Valley Research Foundation. As an important part of this new and exciting program we are conducting with the help of the National Heart Foundation, we would like you to accept and use this booklet.

The booklet has the main heading “Active Living” and is about maintaining an active lifestyle. This booklet was designed to help people just like you to gain confidence in yourself and your ability to continue doing regular moderate physical activity.

The booklet we have sent you is titled “Active Living: Keeping in step”.

This booklet is designed to help you maintain your physically active lifestyle.

How to make this booklet work for you:
- read the booklet a couple of times,
- write in the booklet,
- underline the parts that really mean something you, and
- mark the pages you would like to return to quickly.

If for some reason you stop doing your physical activity, for instance if you go on holidays, you may find some of the information in the booklet useful to help get you back on track.

If you have any questions or would like more information on ways to be active in the Illawarra please phone the National Heart Foundation Illawarra Physical Activity Project Office on (02) 4275 1066.

Yours sincerely,

Alison Miners
National Heart Foundation Research Officer
PhD Student University of Wollongong
Appendix H

Process evaluation
items
Appendix H

H.1 Process evaluation questionnaire
Process Evaluation of the Active Living Booklets October 1997

Interview Script

“Good morning/afternoon, may I please speak to {subjects name}”

If YES, go to section when respondent is speaking

If NO, “Is there a time I can call back to speak to {subjects name}”

If NO, persist

“My name is {your name} and I am calling on behalf of the University of Wollongong and the National Heart Foundation and {subjects name} has agreed to being followed up, so is there a time when I can call back to speak to him/her?”

If YES, continue with contact details

When respondent is speaking

“Hello, my name is {insert your name}, from the Department of Biomedical Science at the University of Wollongong. Thank you for your responses to the survey conducted last month for the National Heart Foundation. I am calling you to conduct a short follow-up interview, it should only take a few minutes of your time. May I ask you a few questions?”

If YES, continue and ask questions

If NO, persist

“This follow-up is important for ongoing National Heart Foundation Research and it should only take a few minutes of your time. Will you please participate?”

If YES, continue with interview questions

If still NO,

“Is there better time that I can call you?”

If still NO,

“I am sorry for bothering you, thank you for your time, good bye <hang up>.
Appendix H

Process Evaluation Interview Questions

(please circle YES or NO and write in response where lines are drawn)

1. Within the last month have you seen any booklets which encourage you to be more physically active?
   i) yes (if yes, go to Q1b)
   ii) no (if no, go to Q2)

1.b If YES, what were they? ________________________________

If subject identifies NHF ActiveLiving Booklets, go to Q3 otherwise ask Q2.

2. Do you recall receiving a set of booklets in the mail with the title 'Active Living' and the National Heart Foundation logo?
   i) yes (If yes, move on to Q3)
   ii) no (if no, check mailing address)

Address: ________________________________
Suburb: _______________ Post code: ______

3. Did you read the {colour} booklet that you were directed to?
   i) yes
   ii) no

4. Did you read the other booklets? (N/A for Action & Maintenance Groups)
   i) yes
   ii) no

5. Have you discussed the booklets with anyone else?
   i) yes
   ii) no
6. What have you done with the booklet/s? __________________________________________

7. Have you tried to become more active since reading the booklet/s?
   
   i) yes
   
   ii) no

8. In the last survey you participated in you indicated that you intended to do more {activity they selected}. How are you going with that?

If subject is going well then say ...“Congratulations, it sounds like you are doing really well. If you have any questions about the booklets or would like more information you can call Alison Miners at the University of Wollongong on 42 21 3881. Thank you very much for your time, Good bye.”

If the participant identifies a problem or barrier, use the list of barriers provided in the TABLES (next Appendix H.2) to give an appropriate response to the stage they are in, followed by the common statement below.

“If you have any questions about the booklets or would like more information you can call Alison Miners at the University of Wollongong on 42 213 881. Thank you very much for your time, Good bye.”

Subject response and your action (including which statement you used)

________________________________________

________________________________________

Any other comments

________________________________________
H.2 Standardised counselling procedure during process evaluation

**PRE-CONTEMPLATION**

In the last survey you participated in you indicated that you did not intend to do any form of physical activity. But did you know that any amount of physical activity that you do, can do you some good whether it is simply walking to the post-box, mowing the lawn or riding an exercise bike. Even small amounts of physical activity done throughout the day like taking the stairs instead of the lift can all add up to better health. We would just like you to consider the benefits of being more active and maybe consider planning to do some activity in the future.

If you have any questions about the booklets or would like more information you can call Alison Miners at the University of Wollongong on 42 213 881.

*Since pre-contemplation subjects did not intend to do any activity after the baseline survey, they were all given the common statement listed above.*
**CONTEMPLATION***

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Encouraging Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>no TIME</td>
<td>Being more active doesn’t have to be one long exercise session, you can do small amounts of activity throughout the day to help your health and well-being. Things like taking the stairs instead of the lift or taking a short walk around the shops at lunchtime can really make a difference to the amount of energy you burn.</td>
</tr>
<tr>
<td>too HARD</td>
<td>Planning to be active these days is much easier than in the old days. Medical experts now say that all you have to do is go for a walk and that doing 3 lots of ten minutes on most days, nearly as good as doing one lot of 30 minutes. Some activities you could try are walking, swimming, riding a bike, playing golf or dancing.</td>
</tr>
<tr>
<td>too TIRED</td>
<td>People who are active say that they actually have more energy than they used to, and they use a little activity as a pick me up when they are feeling tired. You could try doing some activity when you feel tired at work or home and see how much better you feel after.</td>
</tr>
<tr>
<td>not FUN</td>
<td>Choose an activity that you enjoy doing, there are many things you can try like dancing, gardening, playing golf, walking along the beach, riding a bike in the park with the kids. The key is to find an activity that you like doing, then just go for it.</td>
</tr>
<tr>
<td>its BORING</td>
<td>To help prevent you getting bored with activity, try doing activity to music to keep your mind occupied or do your activity in different places or with a friend. You could even try a group activity, like doubles tennis or a walking group. It can be a great way to meet new people!</td>
</tr>
<tr>
<td>not SAFE</td>
<td>If you get someone else involved like a neighbour or friend you will feel much safer and happier when you do activity. You could get a dog or exercise in the comfort of your own home. Walk in a group or during the daytime.</td>
</tr>
<tr>
<td>too OLD</td>
<td>It’s never too late to start, and you don’t have to work up a sweat to get the benefits. A great activity to start with is walking. But if you are unwell talk to your GP about what activity might be right for you.</td>
</tr>
<tr>
<td>get SORE</td>
<td>Slight muscle soreness after physical activity is common especially when you are just starting out. The best way to help you recover is to do some light walking and stretching.</td>
</tr>
<tr>
<td>Relapse</td>
<td>Don’t worry you are not the only one to go through this. The advantage you have now is you know what is going to make you stumble and you can plan to prevent or overcome this in the future. All you have to do to get back on track is to remember why you wanted to be more active in the first place and think about how good it felt after you were active last time. This can help re-motivate you to get going again.</td>
</tr>
</tbody>
</table>

* Please note font has been reduced to fit onto one page for the appendices.
## PREPARATION

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Encouraging Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>no TIME</td>
<td>Remember any activity you do is good for you. If you find it difficult to fit in one long session do your activity in 10 minute lots. Ride a bike or walk to work, use the stairs where ever possible and ride or walk back home again. Snacking on movement throughout the day is better for you than bingeing on vigorous activity occasionally.</td>
</tr>
<tr>
<td>too HARD</td>
<td>Being more active doesn’t mean working yourself into a red faced sweat. You can be more active simply by walking along the beach, taking the kids for a ride on their bikes or swimming. And all it adds is 30 minutes to your daily fun.</td>
</tr>
<tr>
<td>too TIRED</td>
<td>There will always come a time when you just cannot be bothered, but all you have to do is think how great you feel after you have done something. If you really can’t bring yourself to do what you had planned, try doing just 10 minutes of something. At least then you won’t feel guilty later on for not doing anything.</td>
</tr>
<tr>
<td>not FUN</td>
<td>Having fun and enjoying what you do are the key to anything we do. Why should things be different for activity. There are so many things you can try like dancing, gardening, playing golf, walking along the beach, riding a bike in the park with the kids or taking a dog for a walk. Try a few different activities until you find one you like doing, then go for it.</td>
</tr>
<tr>
<td>Its BORING</td>
<td>If you are battling with boredom, find an activity partner. An activity partner can be anyone a friend, relative or neighbour. By doing your activity together and you can encourage and help each other when you are not motivated.</td>
</tr>
<tr>
<td>not SAFE</td>
<td>If you get someone else involved like a neighbour or friend you will feel much safer and happier when you do you activity. You could get a dog or exercise in the comfort of your own home. Walk in a group or during the daytime.</td>
</tr>
<tr>
<td>too OLD</td>
<td>It’s never too late to start, and you don’t have to work up a sweat to get the benefits. A great activity to start with is walking. But if you are unwell talk to your GP about what activity might be right for you.</td>
</tr>
<tr>
<td>get SORE</td>
<td>Slight muscle soreness after physical activity is common especially when you are just starting out. The best way to help you recover is to do some light walking and stretching. Remember to warm up and cool down if you are planning vigorous activity</td>
</tr>
<tr>
<td>Relapse</td>
<td>A lot of people try to be more active, then stop. You shouldn’t see this as a failure rather congratulate yourself for taking the first step. All you have to do to get back on track is to remember why you wanted to be more active in the first place and think about how good it felt after you were active last time. This can help re-motivate you to get going again.</td>
</tr>
</tbody>
</table>
# ACTION & MAINTENANCE

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Encouraging Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>no TIME</td>
<td>Finding the time to be active can be hard, but if you plan to be active at a similar time each day you can get into a routine, so it is just like brushing your teeth in the morning. Remember to choose an activity that you enjoy, because if you have fun then you are more likely to want to keep doing it</td>
</tr>
<tr>
<td>too HARD</td>
<td>Being moderately active is as simple as going for a 30 minute walk. If you don't like walking then you could try riding a bike, or playing a round of golf. If you want to or you already doing more than that but are finding it hard to keep going, maybe finding someone to be active with will help keep you motivated.</td>
</tr>
<tr>
<td>too TIRED</td>
<td>Remember how good it feels when you get back after an activity session. All you have to do to get motivated again is to think about this and how much better you feel or how bad you will continue to feel if you don't do some activity.</td>
</tr>
<tr>
<td>not FUN</td>
<td>A lot of people who have been active for a while might start to get bored with their activity. One way to prevent this is to try new and different activities, you can even mix your activities up during the week like going for a walk after work on Monday, a swim at lunchtime on Tuesday and go to a dancing lesson on Thursday night. Mixing it up can help keep it interesting for you.</td>
</tr>
<tr>
<td>its BORING</td>
<td>Review your activity program, you could look at various aspects of your activity program and maybe you can change the time you do it, the type of activity you do or maybe you could find someone to do your activity with. Varying the activities you do may be a great way to relieve the boredom.</td>
</tr>
<tr>
<td>not SAFE</td>
<td>If you get someone else involved like a neighbour or friend you will feel much safer and happier when you do you activity. You could get a dog or exercise in the comfort of your own home. Walk in a group or during the daytime.</td>
</tr>
<tr>
<td>too OLD</td>
<td>It's never too late to start, and you don't have to work up a sweat to get the benefits. A great activity to start with is walking. But if you are unwell talk to your GP about what activity might be right for you.</td>
</tr>
<tr>
<td>get SORE</td>
<td>Slight muscle soreness after physical activity is common especially when you are just starting out. The best way to help you recover is to do some light walking and stretching. Remember to warm up and cool down if you are planning vigorous activity</td>
</tr>
<tr>
<td>Relapse</td>
<td>Don't worry you are not the only one to go through this. The advantage you have now is you know what is going to make you stumble and you can plan to prevent or overcome this in the future. All you have to do to get back on track is to remember why you wanted to be more active in the first place and think about how good it felt after you were active last time. This can help re-motivate you to get going again.</td>
</tr>
</tbody>
</table>
Appendix I

Stage of Change analysis
I.1 Booth Stage Algorithm

The Booth Stage Algorithm is based on recent (past 2-weeks) and past (6-months ago) physical activity participation and also uses the behavioural construct of intention to classify the stages according the algorithm shown in Table J.1.

Physical Activity Participation Questions

The following questions are about your participation in physical activity over the LAST 2-WEEKS

1. In the last 2-weeks, how much time have you spent walking for recreation, exercise or to get to or from places for at least 10-minutes consecutively?
   __________ minutes __________ hours

2. In the last 2-weeks, how much time have you spent doing vigorous exercise which made you breathe harder or puff and pant? (eg., football, tennis-singles, netball, squash, athletics, jogging, keep-fit classes and vigorous swimming)
   __________ minutes __________ hours

3. In the last 2-weeks, how much time have you spent doing any other leisure time physical activities that you haven’t mentioned? (eg., more moderate activities such as lawn bowls, gardening and sailing)
   __________ minutes __________ hours

The following questions are about your participation in physical activities over the LAST 6-MONTHS

4. In the last 6-months, how much time did you spend each week, on average, walking for recreation, exercise or to get to or from places for at least 10-minutes consecutively?
   __________ minutes __________ hours

5. In the last 6-months, how much time did you spend each week, on average, doing vigorous exercise which made you breathe harder or puff and pant? (eg., football, tennis-singles, netball, squash, athletics, jogging, keep-fit classes and vigorous swimming)
   __________ minutes __________ hours

6. In the last 6-months, how much time did you spend each week, on average, doing any other leisure time physical activities that you haven’t mentioned? (eg., more moderate activities such as lawn bowls, gardening and sailing)
   __________ minutes __________ hours

7. The following statements are about the amount of physical activity you INTEND to do in the near future. Please choose the statement which best describes how you feel at present.
   □ I DO NOT INTEND to be more active than I have been over the last 2-weeks.
   □ I INTEND to become more active over the next month than I have been over the last 2-weeks.
   □ I INTEND to become more active sometime over the next 6 months than I have been over the last 2-weeks.
<table>
<thead>
<tr>
<th>Intention to be more active</th>
<th>Active 6-months ago</th>
<th>Active 2-weeks ago</th>
<th>INactive 6-months ago</th>
<th>INactive 2-weeks ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do NOT intend to do more</td>
<td>Maintenance</td>
<td>Relapse</td>
<td>Action</td>
<td>Pre-contemplation</td>
</tr>
<tr>
<td>INTEND to do more in next month</td>
<td>Maintenance</td>
<td>Preparation</td>
<td>Action</td>
<td>Preparation</td>
</tr>
<tr>
<td>INTEND to do more in next 6-months</td>
<td>Maintenance</td>
<td>Contemplation</td>
<td>Action</td>
<td>Contemplation</td>
</tr>
</tbody>
</table>
## I.2 Stage change data codes

### Table I.2: Categorisation of stage change over time

<table>
<thead>
<tr>
<th>Stage movement category</th>
<th>Stage time 1</th>
<th>Stage time 2</th>
<th>Stage movement category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable Sedentary</td>
<td>Pre-contemplation</td>
<td>Pre-contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Contemplation</td>
<td>Contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Preparation</td>
<td>Preparation</td>
<td>1</td>
</tr>
<tr>
<td>Adopter</td>
<td>Action</td>
<td>Action</td>
<td>2</td>
</tr>
<tr>
<td>Adopter</td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Relapse</td>
<td>Relapse</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Pre-contemplation</td>
<td>Pre-contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Contemplation</td>
<td>Contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Preparation</td>
<td>Preparation</td>
<td>1</td>
</tr>
<tr>
<td>Adopter</td>
<td>Action</td>
<td>Action</td>
<td>2</td>
</tr>
<tr>
<td>Adopter</td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Relapse</td>
<td>Relapse</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Pre-contemplation</td>
<td>Pre-contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Contemplation</td>
<td>Contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Preparation</td>
<td>Preparation</td>
<td>1</td>
</tr>
<tr>
<td>Adopter</td>
<td>Action</td>
<td>Action</td>
<td>2</td>
</tr>
<tr>
<td>Adopter</td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Relapse</td>
<td>Relapse</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Pre-contemplation</td>
<td>Pre-contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Contemplation</td>
<td>Contemplation</td>
<td>1</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Preparation</td>
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<td>Maintenance</td>
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<td>Preparation</td>
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<td>Pre-contemplation</td>
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<td>Contemplation</td>
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</tr>
<tr>
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<td>Preparation</td>
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</tr>
<tr>
<td>Adopter</td>
<td>Action</td>
<td>Action</td>
<td>2</td>
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<tr>
<td>Adopter</td>
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<tr>
<td>Stable Sedentary</td>
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</tr>
<tr>
<td>Stable Sedentary</td>
<td>Preparation</td>
<td>Preparation</td>
<td>1</td>
</tr>
<tr>
<td>Adopter</td>
<td>Action</td>
<td>Action</td>
<td>2</td>
</tr>
<tr>
<td>Adopter</td>
<td>Maintenance</td>
<td>Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>Stable Sedentary</td>
<td>Relapse</td>
<td>Relapse</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendix J

Illawarra RCT
supplementary results
## J.1 Representativeness of the study sample

Table J.1: Physical and social demographic comparisons between 1995 IPAP benchmark sample (n=1197) and subsequent Illawarra RCT samples

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<tbody>
<tr>
<td><strong>Physical demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age (years)</td>
<td>mean ± SD</td>
<td>mean ± SD</td>
<td>mean ± SD</td>
<td>mean ± SD</td>
</tr>
<tr>
<td>height (m)</td>
<td>49.7 ± 5.9</td>
<td>49.4 ± 5.8</td>
<td>49.4 ± 5.8</td>
<td>49.02 ± 5.71</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>1.68 ± 0.10</td>
<td>1.68 ± 0.10</td>
<td>1.68 ± 0.10</td>
<td>1.68 ± 0.10</td>
</tr>
<tr>
<td>Body Mass Index (Kg/M²)</td>
<td>73.7 ± 14.4</td>
<td>74.1 ± 14.4</td>
<td>74.1 ± 14.5</td>
<td>74.6 ± 15.0</td>
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<td><strong>Social demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>42.6</td>
<td>44.0</td>
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<td>42.6</td>
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<tr>
<td>female</td>
<td>57.4</td>
<td>56.0</td>
<td>54.6</td>
<td>57.4</td>
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<tr>
<td>marital status</td>
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<tr>
<td>married/defacto</td>
<td>79.7</td>
<td>80.7</td>
<td>80.5</td>
<td>80.5</td>
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<tr>
<td>single/widow</td>
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<td>19.4</td>
<td>19.5</td>
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</tr>
<tr>
<td>children at home</td>
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<tr>
<td>yes</td>
<td>60.4</td>
<td>62.3</td>
<td>64.9</td>
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<tr>
<td>no</td>
<td>31.1</td>
<td>29.8</td>
<td>27.8</td>
<td>26.6</td>
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<tr>
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<td>8.5</td>
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<tr>
<td>education level</td>
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<td></td>
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<tr>
<td>&lt; 10 years</td>
<td>52.1</td>
<td>49.1</td>
<td>48.5</td>
<td>50.2</td>
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<tr>
<td>≥10 years</td>
<td>47.9</td>
<td>50.9</td>
<td>51.5</td>
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<tr>
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<td>manager/</td>
<td></td>
<td></td>
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</tr>
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<td>professional</td>
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<td>31.7</td>
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<td>30.6</td>
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<td>trades person</td>
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<td>10.0</td>
<td>10.2</td>
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<tr>
<td>clerk</td>
<td>8.1</td>
<td>8.8</td>
<td>9.2</td>
<td>10.8</td>
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<tr>
<td>sales &amp; service</td>
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<td>8.7</td>
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</tr>
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<td>driver/labourer</td>
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<td>10.3</td>
<td>11.1</td>
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<td>0.2</td>
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<td>place of birth</td>
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<td>main language</td>
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<td>English</td>
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<td>spoken at home</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>other</td>
<td>5.8</td>
<td>3.5</td>
<td>4.6</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* all data based on the original 1995 data-set

# includes students, unemployed and retired occupations
Table J.2: Mean physical activity data comparisons between the IPAP benchmark data set and the Illawarra RCT samples

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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>walking</td>
<td>2.15 ± 2.97</td>
<td>2.14 ± 2.96</td>
<td>2.13 ± 3.00</td>
<td>1.70 ± 2.82</td>
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<tr>
<td>moderate</td>
<td>2.31 ± 3.47</td>
<td>2.29 ± 3.41</td>
<td>2.32 ± 3.44</td>
<td>1.57 ± 2.73</td>
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<tr>
<td>vigorous</td>
<td>0.78 ± 1.95</td>
<td>0.83 ± 2.00</td>
<td>0.88 ± 2.08</td>
<td>0.39 ± 1.39</td>
</tr>
<tr>
<td>total Activity</td>
<td>5.24 ± 5.07</td>
<td>5.25 ± 5.06</td>
<td>5.34 ± 5.08</td>
<td>3.66 ± 4.23</td>
</tr>
</tbody>
</table>

* all data based on the original 1995 data-set
### J.2 Background media influences

#### Table J.3: Unprompted message recall by the intervention and control groups at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2-months (n)</th>
<th>6-months (n)</th>
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<td>exercise for Health</td>
<td>intervention</td>
<td>46</td>
<td>51</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>54</td>
<td>67</td>
<td>34</td>
</tr>
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<td>specific Campaign</td>
<td>intervention</td>
<td>1</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>‘no ifs...no buts’</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>specific Campaign</td>
<td>intervention</td>
<td>19</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>control</td>
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<td>18</td>
<td>5</td>
</tr>
<tr>
<td>exercise and heart</td>
<td>intervention</td>
<td>10</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>10</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>exercise and diet</td>
<td>intervention</td>
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<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
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<td>-</td>
<td>1</td>
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<td>exercise and smoking</td>
<td>intervention</td>
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<td>9</td>
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<td></td>
<td>control</td>
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<td>2</td>
<td>9</td>
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<td>general health</td>
<td>intervention</td>
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<td>8</td>
<td>1</td>
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<td></td>
<td>control</td>
<td>5</td>
<td>6</td>
<td>1</td>
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<td>diet</td>
<td>intervention</td>
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<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>‘Life Be In It’</td>
<td>intervention</td>
<td>4</td>
<td>3</td>
<td>4</td>
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<td></td>
<td>control</td>
<td>3</td>
<td>1</td>
<td>13</td>
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<tr>
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<td>2</td>
<td>4</td>
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<td></td>
<td>control</td>
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<td>1</td>
<td>2</td>
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<td>-</td>
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<td>control</td>
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<td>1</td>
<td>-</td>
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<td>5</td>
<td>3</td>
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<td></td>
<td>control</td>
<td>6</td>
<td>2</td>
<td>3</td>
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<tr>
<td>smoking</td>
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<td>8</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>12</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

### J.3 Change in walking for transport and/or recreation

The following figures related specifically to walking for transport (see Figure J.1) and walking for recreation (see Figure J.2).
Unlike the total walking data (walking for transport and walking for recreation combined, see Section 6.6.1) there was no significant group ($F(1, n = 356) = 0.09, p = 0.76$) or group $\times$ time interaction ($F(1, n = 356) = 1.00, p = 0.37$) when only the data related to walking for transport. There was however a significant effect of time ($F(1, n = 356) = 8.85, p < 0.001$) for the poled group data. This time effect was significant between baseline and 2-months ($p < 0.001$), but not between baseline and 6-months ($p = 0.41$).

Figure J.1: Average time reported walking for TRANSPORT $\pm$ standard deviation (hours per week) reported by the intervention ($n = 175$) and control ($n = 181$) groups at baseline, 2 and 6-months.

There was no significant effects found when the data for walking for recreation were analysed separately, either for a group effect ($F(1, n = 356) = 3.01, p = 0.08$) or a group $\times$ time interaction ($F(1, n = 356) = 1.39, p = 0.25$). Furthermore, there was no significant effect of time ($F(1, n = 356) = 1.62, p = 0.20$) for the poled group data.
Figure J.2: Average time reported walking for RECREATION ± standard deviation (hours per week) reported by the intervention (n = 175) and control (n = 181) groups at baseline, 2 and 6-months.
Figure J.3: Moderate physical activities reported by the intervention group: baseline, 2 and 6-months
Figure J.4:  Moderate physical activities reported by the control group: baseline, 2 and 6-months

'other' includes dancing, tai chi, swimming, yoga & other sports
J.4  Specific vigorous physical activities reported

Figure J.5: Vigorous physical activities reported by the intervention group: baseline, 2 and 6-months
Figure J.6: Vigorous physical activities reported by the control group: baseline, 2 and 6-months
Appendix K

Illawarra RCT
Stages & Processes of Change
results
The results reported in this Appendix refer to the changes in use of the Processes of Change in Section K.1. However, Sections K.1 and K.2 are based movement through the Stages of Change model from the inadequately active stages (PC, C & P) to the adequately active stages (A & M) as described in Section 5.8.6.2 and 6.12.2. Whereas, the results reported in Sections K.3 and K.4 are based movement through the Stages of Change model from the sedentary stages (PC & C) to the active stages (P, A & M).

K.1 Processes of Change

Similar proportions of each study group reported using each of the Processes of Change at baseline (see Table K1), which reinforces the comparability between the two groups at baseline.

Table K.1: Use of the 10 Processes of Change* by the intervention (n = 227) and control (n = 235) groups at baseline

<table>
<thead>
<tr>
<th>Processes of Change#</th>
<th>intervention group (%)</th>
<th>control group (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>never/seldom</td>
<td>occasionally</td>
</tr>
<tr>
<td>1</td>
<td>78</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>37</td>
<td>23</td>
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<tr>
<td>3</td>
<td>30</td>
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<td>4</td>
<td>71</td>
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<td>5</td>
<td>34</td>
<td>22</td>
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<tr>
<td>6</td>
<td>46</td>
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<td>7</td>
<td>32</td>
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<td>9</td>
<td>38</td>
<td>28</td>
</tr>
<tr>
<td>10</td>
<td>39</td>
<td>22</td>
</tr>
</tbody>
</table>

* 1. **Stimulus control**: You put things around your home to remind you of exercising.
2. **Self-liberation**: You tell yourself if you try hard enough you can keep exercising.
3. **Reinforcement management**: When you exercise you tell yourself that you are being good to yourself by taking good care of your body.
4. **Helping relationships**: You have someone who provides feedback about your exercising.
5. **Counter conditioning**: When you are feeling tense you find exercise is a great way to relieve your worries.
6. **Dramatic relief**: You react emotionally to warnings about an inactive lifestyle.
7. **Social liberation**: You are aware of more and more people encouraging you to exercise these days.
8. **Consciousness raising**: You look for information related to exercise.
9. **Environment re-evaluation**: You realise that you might be able to influence others to be healthier if you exercised more.
10. **Self-re-evaluation**: You get frustrated with yourself if you don't exercise.

Each process of Change item outlined above were scored by the participants on a Likert Scale from (1) Never to (5) Repeatedly.
Appendix K

K.2 Change in mean use of each Process of Change in participants who progressed or relapsed their Stage of Change between baseline and 2-months

These analyses investigated whether participants in each study group who progressed their Stage of Change altered their use of the Processes of Change between baseline and 2-months. There were no significant differences in either study group in terms of the participants who progressed their Stage of Change between baseline and 2-months and their reported use of the Processes of Change (see Table K.2). However, the Processes of Change ‘Stimulis control’ almost reached significance within the intervention group, whereby the participants who progressed their Stage of Change reported a higher mean use of the process than those who remained stable or relapsed.

Table K.2. Difference in the means for each Processes of Change in the intervention and control group participants who progressed at least one Stage of Change compared to those who remained stable or relapsed between baseline and 2-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>intervention group</th>
<th>mean change</th>
<th>p-value</th>
<th>control group</th>
<th>mean change</th>
<th>p-value</th>
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<tbody>
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<td>n</td>
<td></td>
<td>n</td>
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<tr>
<td>1 Stimulis control progressed</td>
<td>131</td>
<td>0.38</td>
<td>0.08</td>
<td>116</td>
<td>0.20</td>
<td>0.08</td>
</tr>
<tr>
<td>2 Self-liberation progressed</td>
<td>131</td>
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<td>0.27</td>
<td>116</td>
<td>0.09</td>
<td>0.27</td>
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<tr>
<td>3 Reinforcement management progressed</td>
<td>131</td>
<td>-0.03</td>
<td>0.53</td>
<td>116</td>
<td>0.22</td>
<td>0.53</td>
</tr>
<tr>
<td>4 Helping relationships progressed</td>
<td>131</td>
<td>0.34</td>
<td>0.57</td>
<td>116</td>
<td>0.16</td>
<td>0.57</td>
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<tr>
<td>5 Counter conditioning progressed</td>
<td>131</td>
<td>0.21</td>
<td>0.30</td>
<td>116</td>
<td>-0.02</td>
<td>0.30</td>
</tr>
<tr>
<td>6 Dramatic relief progressed</td>
<td>129</td>
<td>0.09</td>
<td>0.84</td>
<td>116</td>
<td>-0.05</td>
<td>0.84</td>
</tr>
<tr>
<td>7 Social liberation progressed</td>
<td>131</td>
<td>0.02</td>
<td>0.87</td>
<td>116</td>
<td>0.09</td>
<td>0.87</td>
</tr>
<tr>
<td>8 Consciousness raising progressed</td>
<td>131</td>
<td>0.08</td>
<td>0.60</td>
<td>116</td>
<td>0.19</td>
<td>0.60</td>
</tr>
<tr>
<td>9 Environmental re-evaluation progressed</td>
<td>130</td>
<td>-0.02</td>
<td>0.60</td>
<td>115</td>
<td>0.12</td>
<td>0.60</td>
</tr>
<tr>
<td>10 Self re-evaluation progressed</td>
<td>131</td>
<td>-0.11</td>
<td>0.60</td>
<td>116</td>
<td>-0.09</td>
<td>0.60</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 2-month follow-up Processes of Change Score.
K.3 Change in mean use of each Process of Change in participants who progressed or relapsed their Stage of Change between baseline and 6-months

These analyses investigated whether participants in each study group who progressed their Stage of Change altered their use of the Processes of Change between baseline and 6-months. As with the 2-month analyses there were no significant differences in either study group in terms of the participants who progressed their Stage of Change between baseline and 6-months and their reported use of the Processes of Change (see Table K.3). However, the Processes of Change ‘social liberation’ and ‘reinforcement management’ almost reached significance within the control group.

Table K.3: Difference in the means for each Processes of Change in the intervention and control group participants who progressed at least one Stage of Change compared to those who remained stable or relapsed between baseline and 6-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement through the Stages of Change</th>
<th>mean change*</th>
<th>p-value</th>
<th>mean change*</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>intervention group</td>
<td></td>
<td></td>
<td>control group</td>
<td></td>
</tr>
<tr>
<td>1 Stimulus</td>
<td>progressed</td>
<td>102</td>
<td>0.15</td>
<td>90</td>
<td>0.18</td>
</tr>
<tr>
<td>control</td>
<td>stable/relapsed</td>
<td>71</td>
<td>-0.13</td>
<td>89</td>
<td>-0.12</td>
</tr>
<tr>
<td>2 Self-liberation</td>
<td>progressed</td>
<td>102</td>
<td>0.51</td>
<td>88</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>70</td>
<td>0.30</td>
<td>88</td>
<td>-0.02</td>
</tr>
<tr>
<td>3 Reinforcement</td>
<td>progressed</td>
<td>102</td>
<td>0.30</td>
<td>89</td>
<td>0.06</td>
</tr>
<tr>
<td>management</td>
<td>stable/relapsed</td>
<td>70</td>
<td>0.01</td>
<td>88</td>
<td>0.41</td>
</tr>
<tr>
<td>4 Helping</td>
<td>progressed</td>
<td>101</td>
<td>0.23</td>
<td>90</td>
<td>0.08</td>
</tr>
<tr>
<td>relationships</td>
<td>stable/relapsed</td>
<td>71</td>
<td>-0.01</td>
<td>89</td>
<td>-0.02</td>
</tr>
<tr>
<td>5 Counter</td>
<td>progressed</td>
<td>102</td>
<td>0.33</td>
<td>90</td>
<td>0.24</td>
</tr>
<tr>
<td>conditioning</td>
<td>stable/relapsed</td>
<td>71</td>
<td>0.28</td>
<td>89</td>
<td>-0.09</td>
</tr>
<tr>
<td>6 Dramatic</td>
<td>progressed</td>
<td>100</td>
<td>0.20</td>
<td>88</td>
<td>0.02</td>
</tr>
<tr>
<td>relief</td>
<td>stable/relapsed</td>
<td>71</td>
<td>0.09</td>
<td>89</td>
<td>-0.25</td>
</tr>
<tr>
<td>7 Social</td>
<td>progressed</td>
<td>101</td>
<td>0.15</td>
<td>90</td>
<td>0.26</td>
</tr>
<tr>
<td>self-re-evaluation</td>
<td>stable/relapsed</td>
<td>71</td>
<td>-0.17</td>
<td>89</td>
<td>-0.08</td>
</tr>
<tr>
<td>8 Consciousness</td>
<td>progressed</td>
<td>102</td>
<td>-0.17</td>
<td>90</td>
<td>-0.11</td>
</tr>
<tr>
<td>raising</td>
<td>stable/relapsed</td>
<td>71</td>
<td>-0.01</td>
<td>89</td>
<td>-0.03</td>
</tr>
<tr>
<td>9 Environmental</td>
<td>progressed</td>
<td>101</td>
<td>-0.11</td>
<td>90</td>
<td>0.18</td>
</tr>
<tr>
<td>re-evaluation</td>
<td>stable/relapsed</td>
<td>72</td>
<td>0.00</td>
<td>87</td>
<td>0.20</td>
</tr>
<tr>
<td>10 Self</td>
<td>progressed</td>
<td>102</td>
<td>0.15</td>
<td>90</td>
<td>0.11</td>
</tr>
<tr>
<td>re-evaluation</td>
<td>stable/relapsed</td>
<td>72</td>
<td>0.47</td>
<td>89</td>
<td>0.03</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 6-month follow-up Processes of Change Score.
### K.4 Change in mean use of each Process of Change in pre-contemplators who progressed or remained stage stable between baseline and 2-months

This analysis was based on the participants classified as PC’s at baseline. The use of the Processes of Change by the PC’s in each study group who progressed their Stage of Change or remained stable in PC between baseline and 2-months were compared. The only significant change in the use of the Processes of Change was in the intervention group PC’s who progressed at least one stage, where the mean use of the ‘social liberation’ Processes of Change significantly increased (see Table K.4). There were no significant changes noted in the control groups PC’s who progressed or remained stable in terms of the use of the Processes of Change.

**Table K.4:** Mean change scores for each Processes of Change by pre-contemplation stability or progression in the Stages of Change between baseline and 2-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement from the PC stage</th>
<th>intervention group</th>
<th>control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean change</td>
<td>p-value</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>15</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Self-liberation</td>
<td>7</td>
<td>-0.29</td>
<td>0.58</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>15</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Helping relationships</td>
<td>7</td>
<td>0.00</td>
<td>0.92</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>15</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>7</td>
<td>0.40</td>
<td>0.77</td>
</tr>
<tr>
<td>Social liberation</td>
<td>15</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Consciousness raising</td>
<td>7</td>
<td>0.14</td>
<td>0.81</td>
</tr>
<tr>
<td>Environmental re-evaluation</td>
<td>15</td>
<td>0.14</td>
<td>0.41</td>
</tr>
<tr>
<td>Self re-evaluation</td>
<td>7</td>
<td>-1.00</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>-0.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>-0.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>-0.71</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>0.13</td>
<td></td>
</tr>
</tbody>
</table>

*calculated by subtracting the baseline Processes of Change score from the 2-month follow-up Processes of Change Score.*

---

*Appendix K*
K.5 Change in mean use of each Process of Change in Contemplators who progressed or relapsed their Stage of Change between baseline and 2-months

This analysis was based on the participants classified as C’s at baseline. The use of the Processes of Change by the C’s in each study group who progressed their Stage of Change or remained stable in C or relapsed between baseline and 2-months were compared. The only significant changes in the use of the Processes of Change was in the intervention group C’s who progressed at least one stage, where the mean use of the ‘self re-evaluation’ Processes of Change significantly decreased and within the control group ‘dramatic relief’ significant increased in those C’s who progressed their Stage of Change (see Table K.5).

Table K.5: Mean change scores for each Processes of Change by contemplation stability or progression in the Stages of Change between baseline and 2-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement from the C stage</th>
<th>intervention group n</th>
<th>mean change</th>
<th>p-value</th>
<th>control group n</th>
<th>mean change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Stimulus control</td>
<td>progressed</td>
<td>32</td>
<td>0.31</td>
<td></td>
<td>23</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>2 Self-liberation</td>
<td>progressed</td>
<td>32</td>
<td>0.25</td>
<td></td>
<td>23</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>3 Reinforcement</td>
<td>progressed</td>
<td>32</td>
<td>-0.34</td>
<td></td>
<td>23</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>4 Helping relationships</td>
<td>progressed</td>
<td>32</td>
<td>0.38</td>
<td></td>
<td>23</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>5 Counter conditioning</td>
<td>progressed</td>
<td>32</td>
<td>0.00</td>
<td></td>
<td>23</td>
<td>-0.48</td>
<td></td>
</tr>
<tr>
<td>6 Dramatic relief</td>
<td>progressed</td>
<td>32</td>
<td>-0.10</td>
<td>0.72</td>
<td>23</td>
<td>-0.52</td>
<td>0.02</td>
</tr>
<tr>
<td>7 Social liberation</td>
<td>progressed</td>
<td>32</td>
<td>0.09</td>
<td></td>
<td>23</td>
<td>-0.26</td>
<td></td>
</tr>
<tr>
<td>8 Consciousness raising</td>
<td>progressed</td>
<td>32</td>
<td>-0.22</td>
<td></td>
<td>23</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>9 Environmental re-evaluation</td>
<td>progressed</td>
<td>32</td>
<td>0.45</td>
<td></td>
<td>23</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>10 Self re-evaluation</td>
<td>progressed</td>
<td>32</td>
<td>0.80</td>
<td>0.03</td>
<td>23</td>
<td>0.17</td>
<td>0.62</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 2-month follow-up Processes of Change Score.
K.6 Change in mean use of each Process of Change in Preparers who progressed or relapsed their Stage of Change between baseline and 2-months

This analysis was based on the participants classified as P’s at baseline. The use of the Processes of Change by the P’s in each study group who progressed their Stage of Change or remained stable in P or relapsed between baseline and 2-months were compared. The only significant changes in the use of the Processes of Change was in the intervention group P’s who progressed at least one stage, where the mean use of the ‘counter conditioning’ Processes of Change significantly increased and within the control group there were no significant change in the use of the Processes of Change (see Table K.6).

Table K.6: Mean change scores for each Processes of Change by Preparation stability or progression through the Stages of Change between baseline and 2-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement from the P stage</th>
<th>intervention group</th>
<th>control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean change</td>
<td>p-value</td>
</tr>
<tr>
<td>Stimulis</td>
<td></td>
<td>0.47</td>
<td>0.00</td>
</tr>
<tr>
<td>control</td>
<td>0.26</td>
<td>-0.17</td>
<td>0.31</td>
</tr>
<tr>
<td>Self-liberation</td>
<td>30</td>
<td>0.00</td>
<td>0.35</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>30</td>
<td>-0.03</td>
<td>1.00</td>
</tr>
<tr>
<td>management</td>
<td>0.34</td>
<td>0.25</td>
<td>0.03</td>
</tr>
<tr>
<td>Helping</td>
<td></td>
<td>0.47</td>
<td>0.05</td>
</tr>
<tr>
<td>relationships</td>
<td>0.30</td>
<td>0.38</td>
<td>0.09</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>30</td>
<td>0.30</td>
<td>0.60</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td></td>
<td>0.07</td>
<td>0.96</td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td>-0.27</td>
<td>0.30</td>
</tr>
<tr>
<td>libeoration</td>
<td></td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Consciousness raising</td>
<td>30</td>
<td>0.37</td>
<td>0.37</td>
</tr>
<tr>
<td>Environmental re-evaluation</td>
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<td>0.30</td>
<td>0.86</td>
</tr>
<tr>
<td>Self re-evaluation</td>
<td></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>re-evaluation</td>
<td></td>
<td>0.30</td>
<td>0.45</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 2-month follow-up Processes of Change Score.
K.7 Change in mean use of each Process of Change in Pre-contemplators who progressed or remained stage stable between baseline and 6-months

This analysis was based on the participants classified as PC’s at baseline. The use of the Processes of Change by the PC’s in each study group who progressed their Stage of Change or remained stable in PC between baseline and 6-months were compared. The only significant change in the use of the Processes of Change was in the control group PC’s who progressed at least one stage, where the mean use of the ‘consciousness raising’ Processes of Change significantly increased (see Table K.7). There were no significant changes noted in the intervention groups PC’s who progressed or remained stable in terms of the use of the Processes of Change.

Table K.7: Mean change scores for each Processes of Change by pre-contemplation stability or progression through the Stages of Change between baseline and 6-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement from the PC stage</th>
<th>n</th>
<th>mean change</th>
<th>p-value</th>
<th>n</th>
<th>mean change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulus control</td>
<td>progressed</td>
<td>12</td>
<td>-0.42</td>
<td></td>
<td>13</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>-0.40</td>
<td>0.98</td>
<td>4</td>
<td>-0.25</td>
<td>0.38</td>
</tr>
<tr>
<td>Self-liberation</td>
<td>progressed</td>
<td>12</td>
<td>0.58</td>
<td></td>
<td>13</td>
<td>-0.23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.33</td>
<td>0.72</td>
<td>4</td>
<td>1.50</td>
<td>0.07</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>progressed</td>
<td>12</td>
<td>1.17</td>
<td></td>
<td>13</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>management</td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.60</td>
<td>0.67</td>
<td>4</td>
<td>1.50</td>
<td>0.14</td>
</tr>
<tr>
<td>Helping relationships</td>
<td>progressed</td>
<td>12</td>
<td>-0.08</td>
<td></td>
<td>13</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.00</td>
<td>0.89</td>
<td>4</td>
<td>-0.75</td>
<td>0.11</td>
</tr>
<tr>
<td>Counter conditioning</td>
<td>progressed</td>
<td>12</td>
<td>1.08</td>
<td></td>
<td>13</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.40</td>
<td>0.29</td>
<td>4</td>
<td>1.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>progressed</td>
<td>12</td>
<td>0.50</td>
<td></td>
<td>13</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.17</td>
<td>0.67</td>
<td>4</td>
<td>0.00</td>
<td>0.70</td>
</tr>
<tr>
<td>Social liberation</td>
<td>progressed</td>
<td>12</td>
<td>0.17</td>
<td></td>
<td>13</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>-0.20</td>
<td>0.46</td>
<td>4</td>
<td>1.50</td>
<td>0.16</td>
</tr>
<tr>
<td>Consciousness raising</td>
<td>progressed</td>
<td>12</td>
<td>-0.75</td>
<td></td>
<td>13</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.00</td>
<td>0.17</td>
<td>4</td>
<td>-0.75</td>
<td>0.01</td>
</tr>
<tr>
<td>Environmental re-evaluation</td>
<td>progressed</td>
<td>12</td>
<td>0.25</td>
<td></td>
<td>13</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>-0.17</td>
<td>0.63</td>
<td>4</td>
<td>0.75</td>
<td>0.62</td>
</tr>
<tr>
<td>Self re-evaluation</td>
<td>progressed</td>
<td>12</td>
<td>0.33</td>
<td></td>
<td>13</td>
<td>-0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stable/relapsed</td>
<td>5</td>
<td>0.33</td>
<td>1.00</td>
<td>4</td>
<td>0.50</td>
<td>0.49</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 6-month follow-up Processes of Change Score.
K.8 Change in mean use of each Process of Change in Contemplators who progressed or relapsed their Stage of Change between baseline and 6-months

This analysis was based on participants classified in C at baseline. The use of the Processes of Change by the C’s in each study group who progressed their Stage of Change or remained stable in C or relapsed between baseline and 6-months were compared. The only significant changes in the use of the Processes of Change was in the intervention group C’s who progressed at least one stage, where the mean use of the ‘self liberation’ Processes of Change significantly increased and there were no significant changes observed in the control group (see Table K.8).

Table K.8: Mean change scores for each Processes of Change by contemplation stability or progression through the Stages of Change between baseline and 6-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement from the C stage</th>
<th>intervention group</th>
<th>control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>mean change</td>
</tr>
<tr>
<td>1 Stimulus</td>
<td>progressed</td>
<td>28</td>
<td>0.57</td>
</tr>
<tr>
<td>control</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.38</td>
</tr>
<tr>
<td>2 Self-</td>
<td>progressed</td>
<td>28</td>
<td>0.82</td>
</tr>
<tr>
<td>liberation</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.50</td>
</tr>
<tr>
<td>3 Reinforcement</td>
<td>progressed</td>
<td>28</td>
<td>-0.18</td>
</tr>
<tr>
<td>management</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.50</td>
</tr>
<tr>
<td>4 Helping</td>
<td>progressed</td>
<td>28</td>
<td>0.43</td>
</tr>
<tr>
<td>relationships</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.75</td>
</tr>
<tr>
<td>5 Counter</td>
<td>progressed</td>
<td>28</td>
<td>0.07</td>
</tr>
<tr>
<td>conditioning</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.38</td>
</tr>
<tr>
<td>6 Dramatic</td>
<td>progressed</td>
<td>28</td>
<td>-0.04</td>
</tr>
<tr>
<td>relief</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.38</td>
</tr>
<tr>
<td>7 Social</td>
<td>progressed</td>
<td>28</td>
<td>0.21</td>
</tr>
<tr>
<td>liberation</td>
<td>stable/relapsed</td>
<td>8</td>
<td>0.00</td>
</tr>
<tr>
<td>8 Consciousness</td>
<td>progressed</td>
<td>28</td>
<td>-0.39</td>
</tr>
<tr>
<td>raising</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.63</td>
</tr>
<tr>
<td>9 Environmental</td>
<td>progressed</td>
<td>28</td>
<td>0.11</td>
</tr>
<tr>
<td>re-evaluation</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.25</td>
</tr>
<tr>
<td>10 Self</td>
<td>progressed</td>
<td>28</td>
<td>0.04</td>
</tr>
<tr>
<td>re-evaluation</td>
<td>stable/relapsed</td>
<td>8</td>
<td>-0.25</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 6-month follow-up Processes of Change Score.
K.9 Change in mean use of each Process of Change in Preparers who progressed or relapsed their Stage of Change between baseline and 6-months

This analysis was based on the participants classified as P’s at baseline. The use of the Processes of Change by the P’s in each study group who progressed their Stage of Change or remained stable in P or relapsed between baseline and 6-months were compared. There were no significant changes observed in the use of the Processes of Change in either study group between baseline and 6-months (see Table K.9).

Table K.9: Mean change scores for each Processes of Change by preparation stability or progression through the Stages of Change between baseline and 6-months

<table>
<thead>
<tr>
<th>Processes of Change</th>
<th>movement from the P stage</th>
<th>intervention group</th>
<th>control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean change*</td>
<td>p-value</td>
</tr>
<tr>
<td>Stimulus control</td>
<td>24</td>
<td>-0.25</td>
<td>0.45</td>
</tr>
<tr>
<td>Self-liberation</td>
<td>21</td>
<td>0.00</td>
<td>0.49</td>
</tr>
<tr>
<td>Reinforcement</td>
<td>24</td>
<td>0.29</td>
<td>0.89</td>
</tr>
<tr>
<td>Helping</td>
<td>24</td>
<td>0.21</td>
<td>0.79</td>
</tr>
<tr>
<td>Counter</td>
<td>24</td>
<td>0.33</td>
<td>0.00</td>
</tr>
<tr>
<td>Dramatic relief</td>
<td>21</td>
<td>0.13</td>
<td>0.78</td>
</tr>
<tr>
<td>Social liberation</td>
<td>24</td>
<td>-0.43</td>
<td>0.00</td>
</tr>
<tr>
<td>Consciousness raising</td>
<td>24</td>
<td>0.33</td>
<td>0.10</td>
</tr>
<tr>
<td>Environmental re-evaluation</td>
<td>24</td>
<td>-0.09</td>
<td>0.46</td>
</tr>
<tr>
<td>Self re-evaluation</td>
<td>21</td>
<td>-0.08</td>
<td>0.07</td>
</tr>
</tbody>
</table>

* calculated by subtracting the baseline Processes of Change score from the 6-month follow-up Processes of Change Score.
K.10 Use of the behavioural and cognitive Processes of Change by Stage of Change

Consistent with the higher order of the Processes of Change the Behavioural and Cognitive processes were evaluated across the Stages of Change. Consistent with the theory both the intervention and control PC participants used the Processes of Change the least of all (see Figure K.1 and Figure K.2; Prochaska & Velicer, 1997; Marcus, Rossi et al., 1992). Also consistent with the theory the PC’s used the Behavioural processes least of all (Marcus, Rossi et al., 1992). Interestingly only the M participants in the intervention group at baseline were using the Behavioural processes more than the Cognitive processes (see Figure K.1), where participants in P and A are usually using the Behavioural processes more than the Cognitive ones (Marcus & Rossi et al., 1992).

![Figure K.1: Intervention group use of the behavioural and cognitive processes of change (mean) at baseline](image1)

![Figure K.2: Control group use of the behavioural and cognitive processes of change (mean) at baseline](image2)
K.10.1 Use of the behavioural and cognitive Processes of Change by Stage of Change in participants who progressed or relapsed their Stage of Change between baseline and 2-months

Consistent with the analyses presented in Section K.10, the higher order of the Processes of Change the Behavioural and Cognitive processes were between participants in each study group who progressed their Stage of Change and those who relapsed or remained stable between baseline and 2-months.

Within the intervention group the participants who reported stage progression between baseline and 2-months were significantly more likely to report using the behavioural Processes of Change ($t = -3.02, p = 0.003$; see Figure K.3), but there was no effect of the cognitive Processes of Change observed.

![Figure K.3: Intervention group who progressed (n = 116) or remained stable/relapsed (n = 103) their Stage of Change between baseline and 2-months and their respective mean use of the behavioural and cognitive Processes of Change](image)

Within the control group there were no significant effects observed, despite the participants who reported stage progression reporting greater use of both the cognitive and behavioural Processes of Change between baseline and 2-months (see Figure K.4).
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K.10.2 Use of the behavioural and cognitive Processes of Change by Stage of Change in participants who progressed or relapsed their Stage of Change between baseline and 6-months

Consistent with the analyses presented in Section K.10, the higher order of the Processes of Change the Behavioural and Cognitive processes were between participants in each study group who progressed their Stage of Change and those who relapsed or remained stable between baseline and 6-months.

Within the intervention group the participants who reported stage progression between baseline and 6-months were significantly more likely to report using the behavioural Processes of Change ($t = -3.69, \ p < 0.001$; see Figure K.5), but there was no effect of the cognitive Processes of Change observed.
Within the control group there were no significant effects observed, despite the participants who reported stage progression reporting greater use of both the cognitive and behavioural Processes of Change between baseline and 2-months (see Figure K.4).

Figure K.5: Intervention group who progressed (n = 102) or remained stable/relapsed (n = 72) their Stage of Change between baseline and 6-months and their respective mean use of the behavioural and cognitive Processes of Change

Figure K.6: Control group who progressed (n = 90) or remained stable/relapsed (n = 90) their Stage of Change between baseline and 6-months and their respective mean use of the behavioural and cognitive Processes of Change
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K.11 Movement through the Stages of Change from the inactive stages to the active stages between baseline and 2-months

The 2-month data indicated that a significant number of the intervention group participants (n = 56) moved from inactive stages to the active stages between baseline and 2-months (McNemar’s $\chi^2 (1, n = 191) = 12.01, p = 0.001$), compared those participants who became less active over the same period. Similarly a significant number of the control group (n = 48) of the inactive participants at baseline moved into the active stages by 2-months (McNemar’s $\chi^2 (1, n = 196) = 10.72, p = 0.001$; see Table K.10).

Table K.10 Movement from inactive to active Stages of Change within the intervention and control groups between baseline and 2-months

<table>
<thead>
<tr>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
<th>Stage at 2-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textbf{intervention group$^*$}</td>
<td>\textbf{PC, C &amp; P}</td>
<td>56 (29)</td>
</tr>
<tr>
<td>\textbf{n = 191}</td>
<td>\textbf{A &amp; M}</td>
<td>53 (28)</td>
</tr>
<tr>
<td>\textbf{control group$^*$}</td>
<td>\textbf{PC, C &amp; P}</td>
<td>48 (24)</td>
</tr>
<tr>
<td>\textbf{n = 198}</td>
<td>\textbf{A &amp; M}</td>
<td>54 (27)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

There was no significant difference observed between the two study groups inadequately active participants by stage who moved into the active stages by 2-months (Yates Corrected $\chi^2 (1, n = 289) = 2.21, p = 0.14$; OR = 1.53, 95% CI = 0.88-2.65).

K.11.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by the inactive Stages of Change

This Section examines the difference between those participants who were in the active stages (A & M) at baseline compared to those participants who were in the inactive stages (PC, C & P) at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months. There was a significant number of both the inactive staged intervention (McNemar’s $\chi^2 (1, n = 219) = 19.55, p < 0.001$) and control group participants (McNemar’s $\chi^2 (1, n = 224) = $
4.99, \( p = 0.03 \) report at least a 1-hour increase in total physical activity between baseline and 2-months (see Table K.11).

**Table K.11: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by the inactive versus active Stages of Change**

<table>
<thead>
<tr>
<th>Stage category</th>
<th>intervention group</th>
<th>control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline n (%)</td>
<td>reported physical activity increased by ( \geq 1 )-hour n (%)</td>
</tr>
<tr>
<td>A &amp; M</td>
<td>87 (40)</td>
<td>23 (11)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>132 (60)</td>
<td>90 (41)</td>
</tr>
<tr>
<td>A &amp; M</td>
<td>87 (39)</td>
<td>22 (10)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>137 (61)</td>
<td>73 (33)</td>
</tr>
</tbody>
</table>

*other* = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Further analysis was conducted between the intervention and control groups inactive baseline participants. The inactive baseline intervention group participants were 1.88 times more likely to increase their total physical activity by at least 1-hour at 2-months, compared to the inactive baseline control group participants (95% CI = 1.11-3.19; see Table K.12).

**Table K.12: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive stage of change**

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ( \geq 1 )-hour n (%)</th>
<th>other* n (%)</th>
<th>( X^2 ) (( p ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>132 (60)</td>
<td>90 (41)</td>
<td>42 (19)</td>
<td>5.64 (0.02)</td>
</tr>
<tr>
<td>control group</td>
<td>137 (61)</td>
<td>73 (33)</td>
<td>64 (29)</td>
<td></td>
</tr>
</tbody>
</table>

*other* = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

The significant difference reported between the inactive baseline intervention and the control group participants was further investigated using backward step-wise Logistic regression analysis to substantiate the above result and determine any
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other independent predictors* of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants. A significant model was found (Model Fit; $\chi^2 = 13.40$ $p < 0.01$ (-2 log likelihood = 326.0)) with all variables except for group allocation, education level and Employment removed from the model. Therefore, the significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants at baseline were; i. being in the intervention group (OR = 2.03, 95% CI = 1.20-3.45), and ii. having <10-years education (OR = 2.04, 95% CI = 1.16-3.45). The other variable retained the model (Employment) was not independently significant (see Table K.13).

Table K.13: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive baseline sample categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>$p$-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td>0.71</td>
<td>0.27</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>group (intervention)</td>
<td>0.71</td>
<td>0.27</td>
<td>0.01</td>
<td>2.03 (1.20-3.45)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.70</td>
<td>0.28</td>
<td>0.01</td>
<td>0.50 (0.29-0.86)</td>
</tr>
<tr>
<td>education (&gt;10-years)</td>
<td>0.55</td>
<td>0.30</td>
<td>0.07</td>
<td>1.73 (0.96-3.12)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention ($p = 0.5$); gender ($p = 0.3$); marital status ($p = 0.8$); language ($p = 0.8$); age ($p = 1.0$); BMI ($p = 0.5$); child at home ($p = 0.4$); baseline activity ($p = 0.8$).

K.12 Movement through the Stages of Change from the inactive stages to the active stages between baseline and 6-months

The 6-month data indicated that a significant number ($n = 45$) of the intervention group participants moved from inactive stages to the active stages between baseline and 6-months (McNemar’s $X^2 (1, n = 156) = 6.48; p = 0.01$), compared those participants who became less active over the same period (see Table K.14).

* The same variable as were used in the previous logistic regression model were entered into the models tested in this Section except that baseline activity status levels changed based on the inactive stage category baseline levels, baseline activity status (<25-minutes per week, ≥25 to 90-minutes per week and ≥90-minutes per week).
Table K.14: Movement from inactive to active Stages of Change within the intervention and control groups between baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 6-months n (%)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A &amp; M</td>
<td>PC, C &amp; P</td>
<td>PC, C &amp; P</td>
</tr>
<tr>
<td>intervention group*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 165</td>
<td></td>
<td>45 (27)</td>
<td>54 (33)</td>
<td></td>
</tr>
<tr>
<td>control group*</td>
<td></td>
<td>A &amp; M</td>
<td>43 (26)</td>
<td></td>
</tr>
<tr>
<td>n = 156</td>
<td></td>
<td></td>
<td>23 (14)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PC, C &amp; P</td>
<td>39 (25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>55 (35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A &amp; M</td>
<td>36 (23)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>26 (17)</td>
<td></td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

This result was not replicated in the control group where 39 of the inactive participants at baseline moved into the active stages by 2-months, compared to 26 of the already active participants who relapsed back into the inactive stages ( McNemar’s $X^2$ (1, n = 196) = 2.21, $p = 0.14$). However, there was no significant difference observed between the two study groups inadequately active participants by stage who moved into the active stages by 6-months (Yates Corrected $X^2$ (1, n = 193) = 0.17, $p = 0.68$; OR = 1.18, 95% CI = 0.64-2.16).

K.12.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by the inactive Stages of Change

The analyses presented in this Section are the same as the analysis conducted in the previous Section, only examined physical activity change over 6-months. A significant number of the intervention group participants at baseline increase their total physical activity by at least 1-hour compared to their active baseline counterparts ( McNemar’s $X^2$ (1, n = 219) = 17.25, $p <0.001$). Similarly there was a significant number of the control group participants at baseline increase their total physical activity by at least 1-hour compared to their active baseline counterparts ( McNemar’s $X^2$ (1, n = 234) = 128.97, $p <0.001$; see Table K.15).
Table K.15: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by active versus inactive Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>87 (40)</td>
<td>16 (7)</td>
<td>71 (32)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>132 (60)</td>
<td>81 (37)</td>
<td>51 (23)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>87 (39)</td>
<td>13 (6)</td>
<td>60 (27)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>137 (61)</td>
<td>74 (33)</td>
<td>77 (34)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

As with the 2-month data there was no significant difference between the number of inadequately active participants by stage at baseline who reported the 1-hour increase between the two study groups' (OR = 1.24, 95% CI = 0.74-2.07; see Table K.16).

Table K.16: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by inactive stage of change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by &gt;=1-hour n (%)</th>
<th>other* n (%)</th>
<th>X^2 (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>132 (60)</td>
<td>81 (37)</td>
<td>51 (23)</td>
<td>1.24</td>
</tr>
<tr>
<td>control group</td>
<td>137 (61)</td>
<td>74 (33)</td>
<td>77 (34)</td>
<td>0.46</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward step-wise Logistic regression analysis was conducted to determine any independent predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants change. A significant model was found (Model Fit; X^2 = 23.87, p < 0.01 (-2 log likelihood = 319.1)). All variables except for gender, education level, and baseline intention were removed from the model. Therefore, the significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants at baseline were; i. being Male (OR = 2.37, 95% CI =
1.34-4.17), ii. having <10-years education (OR = 1.81, 95% CI = 1.05-3.13) and iii. an intention to be more active in the next month at baseline (OR = 3.70, 95% CI = 1.79-7.65) and intending to be more active in the next 6-months at baseline (OR = 3.21, 95% CI = 1.53-6.79; see Table K.17).

Table K.17: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the previously inactive baseline sample categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td>0.86</td>
<td>0.30</td>
<td>0.00</td>
<td>2.37 (1.34-4.17)</td>
</tr>
<tr>
<td>gender (male)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.60</td>
<td>0.28</td>
<td>0.03</td>
<td>0.54 (0.32-0.95)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline intention none)</td>
<td>1.31</td>
<td>0.37</td>
<td>0.00</td>
<td>3.70 (1.79-7.65)</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td></td>
<td></td>
<td></td>
<td>3.21 (1.53-6.79)</td>
</tr>
<tr>
<td>baseline intention (next 6-months)</td>
<td>1.17</td>
<td>0.38</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.3); marital status (p = 0.5); language (p = 0.2); age (p = 0.8); BMI (p = 0.5); child at home (p = 0.7); baseline activity (p = 0.1); Employment status (p = 1.0).

K.13 Movement through the Stages of Change from the sedentary stages to the active stages between baseline and 2-months

The 2-month data indicated that a significant number of the intervention group participants (n = 43) moved from sedentary stages to the active stages between baseline and 2-months (McNemars $\chi^2 (1, n = 191) = 6.89, p = 0.01$) compared the 21 participants who became sedentary over the same period. This significant number was not observed in the control group (McNemars $\chi^2 (1, n = 198) = 2.62, p = 0.11$; see Table K.18).

Table K.18: Movement from sedentary to more active Stages of Change within the intervention and control groups between baseline and 2-months

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 191</td>
<td>PC &amp; C</td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>control group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 198</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed
There was no significant difference observed between the two study groups inadequately active participants by stage who moved into the active stages by 2-months (Yates Corrected $X^2 (1, n = 132) = 3.33, p = 0.07; OR = 2.05, 95% CI = 0.95-4.42).

**K.13.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by the sedentary Stages of Change**

This Section examines the difference between those participants who were in the active stages (P, A & M) at baseline compared to those participants who were in the sedentary stages (PC & C) at baseline who reported at least a 1-hour increase in total physical activity at 2-months.

These data indicate that the sedentary intervention group participants at baseline were not significantly more likely to increase their total physical activity by at least 1-hour than their active baseline counterparts (McNemars $X^2 (1, n = 219) = 13.02, p < 0.001$). Similarly the sedentary control group participants were not significantly more likely to increase their total physical activity by at least 1-hour than their active baseline counterparts (McNemars $X^2 (1, n = 234) = 2.81, p < 0.09; see Table K.19).

**Table K.19: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary verses active Stages of Change**

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>142 (64.8)</td>
<td>65 (30)</td>
<td>77 (35)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>77 (35.2)</td>
<td>48 (22)</td>
<td>29 (13)</td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>146 (65.2)</td>
<td>54 (24)</td>
<td>92 (41)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>78 (34.8)</td>
<td>41 (18)</td>
<td>37 (17)</td>
</tr>
</tbody>
</table>

*other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
There was no significant difference reported between the sedentary intervention or control group participants who increased their total physical activity by at least 1-hour (OR = 1.49, 95% CI = 0.75-2.98; see Table K.20).

Table K.20: A comparison between the number of sedentary intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline reported physical activity increased by &gt;=1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention</td>
<td>77 (35.2)</td>
<td>48 (22)</td>
<td>29 (13)</td>
</tr>
<tr>
<td>control group</td>
<td>78 (34.8)</td>
<td>41 (18)</td>
<td>37 (17)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline. A significant model was observed (Model Fit; $X^2 = 6.03$, $p = 0.05$ (-2 log likelihood = 191.9)). The model retained education and Employment status but both were not individually significantly predictors. The only significant predictor of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline was; i. having <10 years education (OR = 2.27, 95% CI = 1.10-4.76). The other variable (Employment status) was retained the model, but was not independently significant (see Table K.21).

The same variable as were used in the previous logistic regression model were entered into the models tested in this Section, except that baseline activity status levels changed based on the sedentary stage category baseline levels, baseline activity status (<15-minutes per week, ≥15 to 90-minutes per week and ≥90-minutes per week).
### Table K.21: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously sedentary baseline sample categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.82</td>
<td>0.37</td>
<td>0.03</td>
<td>0.44 (0.21-0.91)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>0.69</td>
<td>0.40</td>
<td>0.08</td>
<td>1.99 (0.91-4.37)</td>
</tr>
<tr>
<td>employed (no)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (yes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention (p = 0.5); gender (p= 0.3); marital status (p = 0.7); language (p = 0.6); age (p = 0.3); BMI (p = 0.4); child at home (p = 0.1); baseline activity (p = 0.8); group allocation (p = 0.2).

### K.14 Movement through the Stages of Change from the sedentary stages to the active stages between baseline and 6-months

The 6-month data indicated that a significant number of the intervention group participants (34) moved from sedentary stages to the active stages between baseline and 6-months (McNemars $X^2 (1, n = 165) = 5.78; p = 0.02$) compared to the 16 participants who became sedentary over the same period. This result, however, was replicated in the control group where only 39 of the sedentary participants at baseline moved into the active stages by 2-months, compared to 20 of the active participants who relapsed back into the sedentary stages (McNemars $X^2 (1, n = 207) =1.31, p = 0.25$, see Table K.22).

### Table K.22: Movement from sedentary to active Stages of Change within the intervention and control groups between baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 6-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PC &amp; C</td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>intervention group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 165</td>
<td>PC &amp; C</td>
<td>34 (21)</td>
</tr>
<tr>
<td></td>
<td>P, A &amp; M</td>
<td>95 (58)</td>
</tr>
<tr>
<td>control group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 156</td>
<td>PC &amp; C</td>
<td>24 (15)</td>
</tr>
<tr>
<td></td>
<td>P, A &amp; M</td>
<td>83 (53)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

There was no significant difference observed between the two study groups inadequately active participants by stage who moved into the active stages by 6-
months (Yates Corrected $X^2 (1, n = 107) = 0.45, p = 0.50; OR = 1.41, 95% CI = 0.60-3.28).

K.14.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by the sedentary Stages of Change

There was a significant number of intervention group participants report alternate stage change between baseline and 6-months ($McNemars X^2 (1, n = 219) = 4.10; p = 0.04$). This significant result was not observed in the control group (see Table K.23).

Table K.23: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour (%)</th>
<th>other* (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>142 (64.8)</td>
<td>54 (25)</td>
<td>88 (40)</td>
<td>4.10 (0.04)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>77 (35.2)</td>
<td>43 (20)</td>
<td>34 (16)</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>146 (65.2)</td>
<td>49 (22)</td>
<td>97 (43)</td>
<td>1.41 (0.23)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>78 (34.8)</td>
<td>41 (18)</td>
<td>37 (17)</td>
<td></td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

However, there was no significant difference reported between the sedentary intervention or control group participants who increased their total physical activity by at least 1-hour at 6-months (OR = 1.14; 95%CI = 0.58-2.26; see Table K.24).

Table K.24: A comparison between the number of sedentary intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by &gt;=1-hour (%)</th>
<th>other* (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77 (35.2)</td>
<td>43 (20)</td>
<td>34 (16)</td>
<td>0.62 (0.007)</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78 (34.8)</td>
<td>41 (18)</td>
<td>37 (17)</td>
<td>0.80 (0.37)</td>
<td></td>
</tr>
</tbody>
</table>
other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the sedentary staged participants at baseline. A significant model was observed (Model Fit; $\chi^2 = 24.60, p < 0.001$ (-2 log likelihood = 175.9)). The model retained gender, education level and baseline intention but not all were not individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the sedentary staged participants at baseline were; i. being Male (OR = 4.24, 95% CI = 1.89-9.43), ii. reporting an intention to be more active within the next month at baseline (OR = 3.55, 95% CI = 1.63-7.80). The other variable retained the model (education level) was not independently significant (see Table K.25).

### Table K.25: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the previously sedentary baseline sample categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention (none)</td>
<td>1.27</td>
<td>0.40</td>
<td>0.00</td>
<td>3.55 (1.63-7.80)</td>
</tr>
<tr>
<td>intention (next month)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.69</td>
<td>0.38</td>
<td>0.07</td>
<td>0.50 (0.24-1.06)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>gender (female)</td>
<td>1.44</td>
<td>0.41</td>
<td>0.00</td>
<td>4.23 (1.89-9.43)</td>
</tr>
<tr>
<td>gender (male)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
</tbody>
</table>

*Variables excluded from the model: marital status ($p = 0.1$); language ($p = 0.3$); age ($p = 0.5$); BMI ($p = 0.2$); child at home ($p = 0.5$); employment status ($p = 0.4$); baseline activity ($p = 0.3$); group allocation ($p = 0.5$).

### K.15 Additional Stages of Change data

The following tables relate to the basic movement through the Stages of Change between baseline and 2-/6-months and between 2- and 6- months in the intervention (see Table K.26) and control (see Table K.27) groups. These data are commented on in the Illawarra results Chapter 6, Section 6.9.
### Table K.26: Movement through the Stages of change between baseline and 2-/6-months and between 2- and 6-months within the intervention group

<table>
<thead>
<tr>
<th>Baseline</th>
<th>2- to 2-months</th>
<th>2- to 6-months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline to 2-months</td>
<td>Baseline to 6-months</td>
</tr>
<tr>
<td></td>
<td>PC  C  P  A  M  R  total</td>
<td>PC  C  P  A  M  R  total</td>
</tr>
<tr>
<td>PC</td>
<td>4    4    3    3    3    -17</td>
<td>6    6    3    -3    -    -18</td>
</tr>
<tr>
<td>C</td>
<td>1    7    11   5    10    2    36</td>
<td>4    4    10    5    13    -    -36</td>
</tr>
<tr>
<td>P</td>
<td>1    3    11   7    22    1    45</td>
<td>3    2    16    4    20    -    -45</td>
</tr>
<tr>
<td>A</td>
<td>4    2    4    3    7    2    22</td>
<td>1    5    4    2    7    3    22</td>
</tr>
<tr>
<td>M</td>
<td>2    4    3    2    35   -    -46</td>
<td>2    3    8    6    28   -    -47</td>
</tr>
<tr>
<td>R</td>
<td>2    1    -    -    3    -    6</td>
<td>1    1    1    2    1    6</td>
</tr>
<tr>
<td>total</td>
<td>5    14   21   32   20    80   172</td>
<td>17   21   42   17    70    4    173</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation, C = Contemplation, P = Preparation, A = Action & M = Maintenance

### Table K.27: Movement through the Stages of change between baseline and 2-/6-months and between 2- and 6-months within the control group

<table>
<thead>
<tr>
<th>Baseline</th>
<th>2- to 2-months</th>
<th>2- to 6-months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline to 2-months</td>
<td>Baseline to 6-months</td>
</tr>
<tr>
<td></td>
<td>PC  C  P  A  M  R  total</td>
<td>PC  C  P  A  M  R  total</td>
</tr>
<tr>
<td>PC</td>
<td>10   1    4    1    4    -20</td>
<td>4    3    5    2    3    -3    -20</td>
</tr>
<tr>
<td>C</td>
<td>5    15    5    5    10    1    41</td>
<td>5    12    5    2    12    4    40</td>
</tr>
<tr>
<td>P</td>
<td>3    8    11   3    19   -    -44</td>
<td>3    7    11   7    13    3    -44</td>
</tr>
<tr>
<td>A</td>
<td>-    2    3    5    7    2    19</td>
<td>-    3    5    2    6    3    19</td>
</tr>
<tr>
<td>M</td>
<td>1    2    9    4    30    4    50</td>
<td>4    3    11   1    27    4    50</td>
</tr>
<tr>
<td>R</td>
<td>1    1    2    -    2    1    7</td>
<td>1    -    3    -    2    1    7</td>
</tr>
<tr>
<td>total</td>
<td>20   29   34   18   72    8   181</td>
<td>17   28   40   14   63    18   180</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation, C = Contemplation, P = Preparation, A = Action & M = Maintenance
Appendix L

Illawarra RCT
Treatment Received
results
Appendix L

The results presented in this Appendix are based on those intervention group participants' who reported actually receiving the self-help print intervention (see Section 5.10 and Section 6.5)*. Hence the group is broadly referred to as the Treatment Received (TR) intervention group and includes data from 185 and 142 intervention group participants in the 2- and 6-month data analysis respectively (see Table L.1).

| Table L.1: Number of participants in the original intervention and control groups’ and the new TR intervention group |
|-------------------------------------------------|------------------|------------------|------------------|
| intervention group                              | baseline         | 2-month          | 6-month          |
| TR intervention group                            | 227              | 208              | 175              |
| control group                                    | 235              | 219              | 181              |

It is acknowledged that TR analysis may introduce a potential bias in that participants who report receiving the self-help print intervention may differ systematically from those who do not. To determine if potential biases exist demographic and baseline Physical activity data from the two groups’ were compared.

| Table L.2: Comparison between the TR intervention and control groups’ mean baseline demographics and physical activity levels |
|-------------------------------------------------|-----------------|-----------------|-----------------|
| Sept 1997 (n = 235) control group               | Sept 1997 (n = 185) TR intervention group | t-value | p-value |
| Demographics                                    |                  |                 |                 |
| gender (male)                                   | 38.3%            | 43.8%           | 0.52**          | 0.47            |
| age (yrs)                                       | 48.9 ± 5.7       | 49.0 ± 5.7      | -0.26           | 0.79            |
| height (m)                                      | 1.68 ± 0.09      | 1.67 ± 0.10     | 0.18            | 0.86            |
| mass (kg)                                       | 74.2 ± 14.8      | 74.1 ± 14.5     | 0.07            | 0.95            |
| BMI (kg/m²)                                     | 26.4 ± 4.6       | 26.4 ± 4.3      | 0.09            | 0.93            |
| Physical activity                               |                  |                 |                 |
| walking (hrs/wk)                                | 1.44 ± 2.28      | 1.13 ± 1.34     | 1.64            | 0.10            |
| moderate (hrs/wk)                               | 1.19 ± 2.23      | 1.17 ± 1.21     | 0.11            | 0.91            |
| vigorous (hrs/wk)                               | 0.70 ± 2.52      | 0.68 ± 2.22     | 0.08            | 0.94            |
| total (hrs/wk)                                  | 3.33 ± 4.10      | 2.98 ± 3.45     | 0.94            | 0.35            |

** Yates Corrected Chi Square

* This analysis was conducted as it may provide important information as to the 'real' effect of the intervention when received as intended.
There were no statistically significant differences found between the TR intervention and the control groups' in terms of terms of their physical demographics and baseline physical activity levels (see Table L.2). Therefore, the two study groups were comparable.

### L.1 Background media recall and impact in the TR intervention group

A similar number of health related media messages were recalled by the TR intervention and control groups' at baseline, 2- and 6-months, with no significant differences noted (baseline $\chi^2 (1, n = 462) = 0.43; p = 0.51$), 2-months $\chi^2 (1, n = 404) = 0.99; p = 0.32$), or 6-month data $\chi^2 (1, n = 323) =0.81; p = 0.37$; see Figure M.1).

![Figure L.1: Frequency of recalling any health messages in the TR intervention and control groups at baseline, 2 and 6-months](image)

There were no significant differences between the number of TR intervention and control group participants who recalled specific physical activity related messages at; baseline (35% versus 53%; $p = 0.24$) 2-months (37% versus 49%; $p = 0.12$), or 6-months (29% verses 28%; $p = 0.88$). Other health related media messages were recalled by both groups and are also presented in Table L.3.
Table L.3: Unprompted message recall by the TR intervention and control groups at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2-months (n)</th>
<th>6-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>TR intervention</td>
<td>38</td>
<td>40</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>54</td>
<td>67</td>
<td>34</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>TR intervention</td>
<td>1</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>'no ifs...no buts'</td>
<td>control</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>TR intervention</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>'Active Over 50's'</td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Exercise &amp; Heart</td>
<td>TR intervention</td>
<td>14</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>34</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>Exercise &amp; Diet</td>
<td>TR intervention</td>
<td>9</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>10</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Exercise &amp; Smoking</td>
<td>TR intervention</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>TR intervention</td>
<td>21</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>23</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>General Health</td>
<td>TR intervention</td>
<td>6</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>5</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Diet</td>
<td>TR intervention</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>TR intervention</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>TR intervention</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>TR intervention</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Community Events</td>
<td>TR intervention</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Smoking</td>
<td>TR intervention</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>6</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Can’t Recall</td>
<td>TR intervention</td>
<td>6</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>12</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

L.2 Changes in reported physical activity between baseline, 2 and 6-months

Results reported in this Section are based on the self-report physical activity levels and are similar to the results presented in Section 6.6.

Consistent with the results presented in 6.6.1, there was a significant group × time interaction with reported walking activity (see Table L.4). Similarly it appeared that
the TR intervention group were significantly more likely to report increased in their time spent walking between baseline and 2-months ($F (1, n = 185) = 10.52, p < 0.001$) and not the control group. Further analysis revealed a significant difference existed between the walking times reported at baseline and 2-months ($t = -4.22, p < 0.001$) but not between baseline and 6-months ($t = 0.40, p = 0.69$).

Table L.4: Mean (± SD) physical activity times (hours per week) reported by the TR intervention (n = 185) and control (n = 181) groups at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>6-months</th>
<th>$F_{group}$</th>
<th>$F_{time}$</th>
<th>$F_{group \times time}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>TR intervention</td>
<td>1.13 ± 1.34</td>
<td>1.89 ± 2.25</td>
<td>1.46 ± 1.50</td>
<td>0.07</td>
<td>8.18*</td>
<td>3.56*</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.44 ± 2.28</td>
<td>1.59 ± 2.18</td>
<td>1.34 ± 1.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>TR intervention</td>
<td>1.16 ± 2.20</td>
<td>2.06 ± 2.96</td>
<td>1.24 ± 1.59</td>
<td>0.17</td>
<td>2.65</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.19 ± 2.23</td>
<td>1.61 ± 2.57</td>
<td>1.33 ± 1.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vigorous</td>
<td>TR intervention</td>
<td>0.68 ± 2.21</td>
<td>0.46 ± 1.35</td>
<td>0.63 ± 1.39</td>
<td>0.56</td>
<td>12.42*</td>
<td>2.14</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.70 ± 2.52</td>
<td>0.40 ± 1.22</td>
<td>0.53 ± 1.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>TR intervention</td>
<td>2.98 ± 3.45</td>
<td>4.41 ± 4.24</td>
<td>3.33 ± 2.64</td>
<td>0.61</td>
<td>9.18*</td>
<td>3.69#</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3.33 ± 4.10</td>
<td>3.60 ± 3.67</td>
<td>3.21 ± 2.98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.01$

# $p < 0.05$

Similar results were reported for moderate physical activity as well, with no significant group interaction (see Table L.4). There were no significant interactions observed with vigorous physical activity (see Table L.4). There was a significant time interaction reported for vigorous physical activity, which was shown to be significant between baseline and 6-months ($t = 2.29, p = 0.02$), but not between baseline and 2-months ($t = 0.88, p = 0.38$).

As with the Intention to Treat (ITT) analysis there was a significant group $\times$ time, and time interaction observed for the pooled total physical activity data (see Table L.4). The time effect was again confirmed to be significant between the amount of
total physical activity reported at baseline compared to 2-months ($t = -4.21, p < 0.001$) but not between baseline and 6-months ($t = -0.52, p = 0.60$). Independent group analyses confirmed that the TR intervention group ($F (1, n = 185) = 10.56, p < 0.001$) significantly increased their total physical activity between baseline and 2-months ($t = -4.04, p < 0.001$), but not between baseline and 6-months ($t = -1.44, p = 0.15$).

Therefore, these results confirm the intervention effect demonstrated in Section 6.6.3 in that the self-help print intervention was effective in increasing the total self-reported physical activity levels of those participants who received it, above the increases reported by the control group at 2-months. It also confirmed that the intervention effect was not maintained up to 6-months, but that the trend for more of the control group to decrease the amount of physical activity they reported at 6-months (which was 7-minutes less than their reported baseline level), while the intervention group maintained a 21-minute increase above their baseline level at 6-months.

### L.3 Proportion of the TR intervention group meeting a criterion of sufficient physical activity per week at baseline, 2 and 6-months

The results presented in this Section are based on the same principle reported in Sections 5.8.3 and 6.7. A significant number of TR intervention group participants who were not reaching the 150-minute criterion at baseline increased their physical activity to meet the criterion by the 2-month follow-up ($McNemars \chi^2 (1, n = 185) = 18.5, p < 0.001$) (see Table L.5). However, there was also a significant increase within observed in the number of control group participants meeting the criterion at 2-months (see Section 6.7), so that there was no significant difference in the number of participants in each group meeting the criterion at 2-months ($Yates corrected \chi^2 (1, n = 420) = 3.21, p = 0.07; OR = 1.47, 95\% CI = 0.97-2.22$). Therefore, the TR results were no different to the ITT results at 2-months.
Table L.5: The number TR intervention group participating in at least 150-minutes of physical activity per week at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th></th>
<th>TR intervention group</th>
<th>2-month n (%)</th>
<th>6-month n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>≥ 150-minutes</td>
<td>&lt; 150-minutes</td>
</tr>
<tr>
<td>n = 185</td>
<td>18 (5)</td>
<td>64 (35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>56 (30)</td>
<td>47 (25)</td>
<td></td>
</tr>
<tr>
<td>n = 142</td>
<td>60 (42)</td>
<td>22 (12)</td>
<td></td>
</tr>
<tr>
<td>≥ 150-minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 150-minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Similar results were reported at 6-months (see Table L.5), with the TR intervention group again demonstrating a significant number of participants were being physically activity at least 150-minutes a week (McNemars $X^2 (1, n = 142) = 14.63, p < 0.001$). Similarly there was no difference between the number of participants in each group meeting the criterion at 6-months either (Yates corrected $X^2 (1, n = 420) = 0.71, p = 0.40; OR = 1.21, 95% CI = 0.80-1.83$).

L.4 Proportions expending adequate amounts of energy from physical activity at baseline, 2 and 6-months

The results presented in this Section are based on the principles reported in Sections 5.8.3 and 6.8. The TR intervention group baseline energy expenditure categories were very similar to those reported by the ITT intervention group at baseline. Hence, there was no difference between the TR intervention group and control group participants’ energy expenditure categories at baseline (Yates Corrected $X^2 (1, n = 420) = 0.00, p = 1.0$; see Table L.6).

Table L.6: Changes in energy expenditure categories in the TR intervention group between baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>TR intervention group n = 185 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline 2-month 6-month</td>
</tr>
<tr>
<td>High</td>
<td>17 (9) 17 (10) 20 (14)</td>
</tr>
<tr>
<td>Moderate</td>
<td>52 (28) 75 (44) 53 (37)</td>
</tr>
<tr>
<td>Low</td>
<td>87 (47) 66 (39) 57 (40)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>29 (16) 13 (8) 12 (9)</td>
</tr>
</tbody>
</table>

A similar proportion of the TR intervention group were expending adequate amount of energy from physical activity at the 2- and 6-month follow-ups as the ITT
intervention group (see Table L.6 & Section 6.8). Also consistent with previous data there was significant increase in TR intervention group participants moving from the inadequate energy expenditure categories to the adequate categories between baseline and 2-months (McNemars $X^2 (1, n = 185) = 15.61, p < 0.001$) and baseline and 6-months (McNemars $X^2 (1, n = 185) = 17.97, p < 0.001$; see Table L.7).

Table L.7: Changes in adequate and inadequate energy expenditure categories in the TR intervention group between baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>baseline energy expenditure</th>
<th>adequate 2-month energy expenditure n = 185 n (%)</th>
<th>inadequate 6-month energy expenditure n = 185 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>60 (32)</td>
<td>56 (30)</td>
</tr>
<tr>
<td>adequate</td>
<td>46 (25)</td>
<td>23 (12)</td>
</tr>
</tbody>
</table>

These data support the results reported in Section 6.8, that the self-help print intervention may have been effective in increasing the physical activity levels of the TR intervention group participants, thereby, increasing the proportion of participants expending an adequate amount of energy from physical activity at 2- and 6-months.

L.5 Movement through the Stages of Change

As reported in Section 6.12 stage change data analysis includes only those participants who were followed up at each data collection point, data from 142 TR intervention group participants are reported in this Section. There was an increase in the active stages (A & M) within the TR intervention group between baseline and 6-months from 38% to 51%. This mainly resulted from a decrease in the number of participants in C and an increase in the number of participants in M at 6-months (see Table L.8). These results are similar to the ITT analysis, however a decrease in the number of participants in the P stage was also reported in the previous results section (Appendix K).
Table L.8: Stage distribution within the TR intervention group at baseline and 6-months

<table>
<thead>
<tr>
<th>Stage</th>
<th>TR intervention group n = 142 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>15 (11)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>31 (22)</td>
</tr>
<tr>
<td>Preparation</td>
<td>38 (27)</td>
</tr>
<tr>
<td>Action</td>
<td>16 (11)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>38 (27)</td>
</tr>
<tr>
<td>Relapse</td>
<td>4 (3)</td>
</tr>
</tbody>
</table>

L.5.1 Progression through the Stages of Change by the TR intervention group between baseline 2 and 6-months

Data in this Section was based on the TR intervention group participants who progressed at least one stage between baseline and 2-months. The same principles of stage progression analysis applied (see Section 5.8.6.1).

These data revealed the TR intervention group participants were 1.57 times more likely to progress at least one stage by 2-months than the control group ($X^2 (1, n = 388) = 4.24, p = 0.04; 95\% CI = 1.02-2.42; $ see Table L.9).

Table L.9: A comparison between the TR intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>Progressed n (%)</th>
<th>Stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n = 169</td>
<td>108 (64)</td>
<td>61 (36)</td>
</tr>
<tr>
<td>control group n = 219</td>
<td>116 (53)</td>
<td>103 (47)</td>
</tr>
</tbody>
</table>

Stage progression between baseline and 6-months revealed that the TR intervention group were not significantly more likely to progress their stage than the control group ($X^2 (1, n = 322) = 1.95; p = 0.16; OR = 1.41, 95\% CI = 0.88-2.25; $ see Table L.10).
Appendix L

Table L.10: A comparison between the TR intervention and control group participants who progressed at least one stage between baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>Progressed n (%)</th>
<th>Stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n = 142</td>
<td>83 (58)</td>
<td>59 (42)</td>
</tr>
<tr>
<td>control group n = 180</td>
<td>90 (50)</td>
<td>90 (50)</td>
</tr>
</tbody>
</table>

These results were in agreement with the ITT results (see Section 6.12.1), whereby significant stage progression was reported by the intervention group who reported receiving the self-help print intervention over the control group at 2-months, but not at 6-months. These results confirm that the positive intervention effects demonstrated at 2-months diminish by 6-months.

L.5.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 6-months by the TR intervention group

The TR intervention group participants who were in the inactive stages (PC, C & P) at baseline were more significantly more likely to move into the active stages (A & M) at the 2-month follow-up (McNemar $\chi^2 (1, n = 158) = 10.72, p < 0.01$; see Table L.11). However, the difference between the TR intervention and control group participants who moved from the inactive stages to the active stages was not significant (Yates Corrected $\chi^2 (1, n = 220) = 2.68, p = 0.10$; OR = 1.63, 95% CI = 0.92-2.89).

Table L.11: Movement from inactive to active Stages of Change within the TR intervention group between baseline, 2 and 6-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
<th>Stage at 6-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PC, C &amp; P</td>
<td>A &amp; M</td>
<td>PC, C &amp; P</td>
</tr>
<tr>
<td>TR intervention group*</td>
<td>48 (30)</td>
<td>48 (30)</td>
<td></td>
</tr>
<tr>
<td>n = 158</td>
<td>42 (27)</td>
<td>20 (13)</td>
<td></td>
</tr>
</tbody>
</table>

|                      | PC, C & P         | A & M                   |                       |
| TR intervention group* | 39 (29)           | 45 (33)                 |                       |
| n = 136              | 33 (24)           | 19 (14)                 |                       |

* all eligible participants followed-up at 2 and 6-months with participants in Relapse removed
As with the 2-month data a significant number of the TR intervention group participants moved from the inactive stages at baseline to the active stages by 6-months ($\chi^2(1, n = 136) = 6.22, p = 0.01$; see Table L.11). However, the difference between the TR intervention and control group participants who moved from the inactive stages to the active stages at 6-months was not significant ($\chi^2(1, n = 178) = 0.26, p = 0.60$; OR = 1.22, 95% CI = 0.65-2.31).

**L.5.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 6-months by the TR intervention group**

Analysis in this Section is similar to the analysis reported in Appendix L, Section L.3. The TR intervention group participants who were in the sedentary stages (PC & C) at baseline were more significantly more likely to move into the active stages (P, A & M) at the 2-month follow-up ($\chi^2(1, n = 158) = 5.16, p = 0.02$; see Table L.12). However, the difference between the TR intervention and control group participants who moved from the inactive stages to the active stages was not significant ($\chi^2(1, n = 122) = 3.52, p = 0.06$; OR = 2.18, 95% CI = 0.97-4.92).

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-months n (%)</th>
<th>6-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n = 158*</td>
<td>PC, C &amp; P</td>
<td>A &amp; M</td>
<td>17 (11)</td>
</tr>
<tr>
<td></td>
<td>A &amp; M</td>
<td></td>
<td>19 (12)</td>
</tr>
<tr>
<td>TR intervention group n = 136*</td>
<td>PC, C &amp; P</td>
<td>14 (10)</td>
<td>32 (24)</td>
</tr>
<tr>
<td></td>
<td>A &amp; M</td>
<td>15 (11)</td>
<td>75 (55)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 6-months with participants in Relapse removed

As with the 2-month results the TR intervention group participants who were in the sedentary stages (PC & C) at baseline were more significantly more likely to move into the active stages (P, A & M) at the 6-month follow-up ($\chi^2(1, n = 158) = 5.44, p = 0.02$; see Table L.12). However, the difference between
the TR intervention and control group participants who moved from the inactive stages to the active stages was not significant (Yates Corrected $\chi^2 (1, n = 99) = 1.71, p = 0.19; OR = 1.89, 95\% CI = 0.89-4.72$).

L.6 Changes in reported physical activity at 2-months adjusted to baseline level

Data presented in this Section were comparable to the ITT results reported in Section 6.9.1.

L.6.1 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

There was a significant increase in the number of participants reporting at least 1-hour more physical activity at 2-months in the TR intervention group (43%; McNemars $\chi^2 (1, n = 185) = 6.57, p = 0.01$; see Table L.13).

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>69 (37)</td>
<td>20 (11)</td>
<td>49 (27)</td>
</tr>
<tr>
<td>inadequate</td>
<td>116 (63)</td>
<td>79 (43)</td>
<td>37 (20)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.

Comparisons between the inadequately active TR intervention and control group participants who increased their physical activity by at least 1-hour at 2-months revealed that the TR intervention group were 1.92 times more likely to increase their total physical activity than the control group (95% CI = 1.12-3.29; see Table L.14).
Table L.14: A comparison between the number of inadequately active TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>X²</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>116 (63)</td>
<td>79 (43)</td>
<td>37 (20)</td>
<td>5.78</td>
</tr>
<tr>
<td>control group</td>
<td>148 (63)</td>
<td>78 (33)</td>
<td>70 (30)</td>
<td>(0.02)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward step-wise logistic regression was again conducted on the data from the inadequately active baseline samples in each study group to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months. All variables* except for group allocation and education level were removed via the backward elimination method (Model Fit; $X^2 = 8.8$, $p = 0.01$ (-2 log likelihood = 326.4)). However, the only significant predictor of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline was being in the TR intervention group (OR = 1.93, 95% CI = 1.13-3.25). The other variable (education level) was retained the model (see Table L.15).

---

* Variables coded into dichotomous values and entered into the model as follows, group allocation (intervention or control group), gender (male and female), marital status (those married or in a de facto relationship and those single or widowed), language (those who speak English at home and other languages), age (≤50 years and >50 years), children living at home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded trichotomously were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), BMI (underweight, normal weight, overweight and obese), baseline activity status (<28-minutes per week, ≥28 to 90-minutes per week and ≥90-minutes per week).
### Table L.15: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group (TR intervention)</td>
<td>0.66</td>
<td>0.27</td>
<td>0.01</td>
<td>1.93 (1.13-3.25)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.50</td>
<td>0.27</td>
<td>0.06</td>
<td>0.60 (0.36-1.03)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention ($p = 0.5$); gender ($p = 0.3$); marital Status ($p = 0.8$); language ($p = 0.7$); age ($p = 0.2$); BMI ($p = 0.4$); child at home ($p = 0.4$); employment status ($p = 0.3$); baseline activity ($p = 0.9$).

### L.6.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

These data indicate that there was no significant difference between the stage change reported by the TR intervention group participants who were in PC, C & P stage (or classified as inactive in the stage model) at baseline and those participants who were in A & M (or classified as active in the stage model) at baseline (McNemars $\chi^2 (1, n = 179) = 3.13$, $p = 0.07$; see Table L.16).

### Table L.16: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>69 (38)</td>
<td>20 (11)</td>
<td>49 (27)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>110 (62)</td>
<td>76 (43)</td>
<td>34 (19)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

The TR intervention group participants who were in PC, C & P at baseline were 1.96 times more likely to move into A & M at 2-months compared to the control group (95% CI = 1.12-3.43; see Table L.17).
Table L.17: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention</td>
<td>110 (62)</td>
<td>76 (43)</td>
<td>34 (19)</td>
<td>5.73</td>
</tr>
<tr>
<td>control group</td>
<td>137 (61)</td>
<td>73 (33)</td>
<td>64 (29)</td>
<td>(0.02)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Logistic regression analysis was run to substantiate the above result and determine any other independent predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants (see Table L.18).

Table L.18: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group (TR intervention)</td>
<td>0.73</td>
<td>0.28</td>
<td>0.00</td>
<td>2.08 (1.20-3.57)</td>
</tr>
<tr>
<td>employed (no)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>employed (yes)</td>
<td>0.67</td>
<td>0.32</td>
<td>0.04</td>
<td>0.51 (0.29-0.90)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.66</td>
<td>0.29</td>
<td>0.02</td>
<td>0.51 (0.29-0.90)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention (p = 0.5); gender (p = 0.2); marital Status (p = 0.7); language (p = 0.6); age (p = 1.0); BMI (p = 0.3); child at home (p = 0.4); employment status (p = 0.1); baseline activity (p = 0.8).

A significant model was found (Model Fit; $X^2 = 13.56, p < 0.01$ (-2 log likelihood = 300.7)) with all variables except for group allocation, education level and employment removed from the model. Therefore, the significant predictors of

* The same variable as were used in the previous logistic regression model were entered into the models tested in this Section except that baseline activity status levels changed based on the inactive stage category baseline levels, baseline activity status (<25-minutes per week, ≥25 to 90-minutes per week and ≥90-minutes per week).
increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants at baseline were; i. being in the TR intervention group (OR = 2.08, 95% CI = 1.20-3.57), ii. having <10-years education (OR = 1.96, 95% CI = 1.11-3.45), and being employed (OR = 1.94, 95% CI = 1.03-3.62; see Table L.18).

L.6.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

These data indicate that a significant number of the TR intervention group participants who were classified as sedentary by the alternate stage category (PC & C) reported at least a 1-hour increase in total physical activity at 2-months (McNemars $X^2 (1, n = 179) = 11.39, p = 0.001$; see Table L.19).

Table L.19: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>114 (64)</td>
<td>41 (23)</td>
<td>24 (13)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>65 (36)</td>
<td>55 (31)</td>
<td>59 (33)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

However, there was no significant difference between the sedentary (classified by alternate stage category) TR intervention or control group participants who increased their total physical activity by at least 1-hour at 2-months (OR = 1.54, 95%CI = 0.75-3.19; see Table L.20).
Table L.20: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>65 (36)</td>
<td>55 (31)</td>
<td>59 (33)</td>
<td>1.20</td>
</tr>
<tr>
<td>control group</td>
<td>78 (35)</td>
<td>41 (18)</td>
<td>37 (17)</td>
<td>0.27</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline. A significant model was observed (Model Fit; $X^2 = 13.1, p < 0.01$ (-2 log likelihood = 171.4))*. The model retained gender, education and BMI but both not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline were; i. being male (OR = 2.38, 95% CI = 1.07-5.33), and ii. reporting <10 years education (OR = 2.22, 95% CI = 1.04-4.55). The other variable (BMI) was retained the model, but was not independently significant (see Table L.21).

The same variable as were used in the previous logistic regression model were entered into the models tested in this Section, except that baseline activity status levels changed based on the sedentary stage category baseline levels, baseline activity status (<15-minutes per week, ≥15 to 90-minutes per week and ≥90-minutes per week).
Table L.21: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td>0.87</td>
<td>0.41</td>
<td>0.03</td>
<td>2.37 (1.07-5.33)</td>
</tr>
<tr>
<td>gender (male)</td>
<td>-0.79</td>
<td>0.38</td>
<td>0.04</td>
<td>0.45 (0.22-0.96)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>1.34</td>
<td>1.14</td>
<td>0.24</td>
<td>3.83 (0.41-35.67)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.80</td>
<td>0.43</td>
<td>0.07</td>
<td>0.45 (0.19-1.04)</td>
</tr>
<tr>
<td>BMI (normal)</td>
<td>-0.82</td>
<td>0.52</td>
<td>0.11</td>
<td>0.43 (0.16-1.22)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group (p = 0.1); intention (p = 0.6); marital Status (p = 0.8); language (p = 0.8); age (p = 0.3); child at home (p = 0.1); employment status (p = 0.2); baseline activity (p = 1.0).

L.7 Changes in reported physical activity at 6-months adjusted to baseline level

Data presented in this Section is comparable to the ITT results reported in Section 6.10.1.

L.7.1 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by energy expenditure

There was no significant increase in the number of TR intervention group participants in the inadequate energy expenditure category reporting at least 1-hour more physical activity at 6-months in the TR intervention group (37%; McNemars $X^2 (1, n = 185) = 1.36, p =0.24$; see Table L.22).

Table L.22: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>69 (37)</td>
<td>14 (8)</td>
<td>55 (30)</td>
</tr>
<tr>
<td>inadequate</td>
<td>116 (63)</td>
<td>69 (37)</td>
<td>47 (25)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Subsequently the difference between the number of inadequately active TR intervention group participants who increased their total physical activity by at least 1-hour between baseline and 6-months (37%) was not significantly different from the equivalent control group participants (34%; OR = 1.25, 95% CI = 0.74-2.10; see Table L.23).

Table L.23: A comparison between the number of inadequately active TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group*</td>
<td>116 (63)</td>
<td>69 (37)</td>
<td>47 (25)</td>
<td>0.57</td>
</tr>
<tr>
<td>control group*</td>
<td>148 (63)</td>
<td>80 (34)</td>
<td>68 (29)</td>
<td>(0.45)</td>
</tr>
</tbody>
</table>

other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless, backward step-wise logistic regression was conducted using only the data from the inadequately active baseline samples from each study group to determine any significant variables that may predict change (Model Fit; $X^2 = 23.16, p < 0.001$ (-2 log likelihood = 317.0). All variables except for gender, education and baseline intention were removed from the model. Therefore, the significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the inadequately active participants at baseline were; i. being male (OR = 2.30, 95% CI = 1.27-4.13), ii. intending to be more active in the next month at baseline (OR = 3.31, 95% CI = 1.77-6.22) and intending to be more active in the next 6-months at baseline (OR = 3.29, 95% CI = 1.62-6.66). The other variable retained in the model (education) was not an independently significant predictor of change (see Table L.24).
Table L.24: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (male)</td>
<td>0.83</td>
<td>0.30</td>
<td>0.00</td>
<td>2.30 (1.27-4.13)</td>
</tr>
<tr>
<td>gender (female)</td>
<td>1.19</td>
<td>0.35</td>
<td>0.00</td>
<td>3.31 (1.77-6.22)</td>
</tr>
<tr>
<td>intention (none)</td>
<td>1.19</td>
<td>0.36</td>
<td>0.00</td>
<td>3.29 (1.62-6.66)</td>
</tr>
<tr>
<td>intention (next month)</td>
<td></td>
<td>0.28</td>
<td>0.07</td>
<td>0.60 (0.35-1.04)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td></td>
<td>0.30</td>
<td>0.00</td>
<td>2.30 (1.27-4.13)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.51</td>
<td>0.28</td>
<td>0.00</td>
<td>0.60 (0.35-1.04)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation (p = 0.3); marital Status (p = 0.5); age (p = 0.9); BMI (p = 0.5); child at home (p = 0.6); employment status (p = 0.9); baseline activity (p = 0.1).

L.7.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by inactive Stages of Change

These data indicate that the TR intervention group participants who were in PC, C & P stages at baseline (or classified as inactive in the stage model) were significantly more likely to move into A & M (or classified as active in the stage model) at 6-months than those who were in A & M at baseline (McNemars $\chi^2$ (1, n = 179) = 13.75, p < 0.001; see Table L.25).

Table L.25: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>69 (38.5)</td>
<td>14 (8)</td>
<td>55 (30)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>110 (61.5)</td>
<td>67 (37)</td>
<td>43 (24)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
However, there was no significant difference found between the number of inactive staged TR intervention group and control group participants at baseline who reported at least a 1-hour increase in total physical activity at 6-months (OR = 1.21, 95%CI = 0.71-2.09; see Table L.26).

Table L.26: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>110 (61.5)</td>
<td>67 (37)</td>
<td>43 (24)</td>
<td>0.38</td>
</tr>
<tr>
<td>control group</td>
<td>137 (61.2)</td>
<td>77 (34)</td>
<td>60 (27)</td>
<td>(0.53)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward step-wise Logistic regression analysis was again conducted to determine any independent predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants change. A significant model was found (Model Fit; $X^2 = 29.56$, $p < 0.001$ (-2 log likelihood = 288.2)). All variables except for gender, education level, language spoken at home, baseline intention and baseline activity level were removed from the model, but not all were independently significant predictors of change. Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants at baseline were; i. being male (OR = 2.61, 95% CI = 1.39-4.89), ii. having <10-years education (OR = 1.82, 95% CI = 1.03-3.23) and iii. intending to be more active in the next month at baseline (OR = 3.49, 95% CI = 1.59-7.64) and intending to be more active in the next 6-months at baseline (OR = 3.13, 95% CI = 1.43-6.85) and iv. participating in <25 minutes per week at baseline (OR = 2.08, 95% CI = 1.06-4.00, compared to those doing ≥90-minutes per week at baseline). The other variables retained in the model (baseline activity ≥25 to 90-minutes per week and language spoken at home ) were not independently significant predictors of change (see Table L.27).
**Appendix L**

Table L.27: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td>0.96</td>
<td>0.32</td>
<td>0.00</td>
<td>2.61 (1.39-4.89)</td>
</tr>
<tr>
<td>gender (male)</td>
<td>1.25</td>
<td>0.40</td>
<td>0.00</td>
<td>3.49 (1.59-7.64)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td>1.14</td>
<td>0.40</td>
<td>0.00</td>
<td>3.13 (1.43-6.85)</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>-0.60</td>
<td>0.29</td>
<td>0.04</td>
<td>0.55 (0.31-0.97)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.07</td>
<td>0.37</td>
<td>0.84</td>
<td>0.93 (0.45-1.93)</td>
</tr>
<tr>
<td>baseline activity (&lt;25min/wk)</td>
<td>-0.73</td>
<td>0.34</td>
<td>0.04</td>
<td>0.48 (0.25-0.94)</td>
</tr>
<tr>
<td>baseline activity (&gt;25 to 90min/wk)</td>
<td>-1.31</td>
<td>0.73</td>
<td>0.07</td>
<td>0.27 (0.06-1.13)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>language (English)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variables excluded from the model: group allocation \(p = 0.3\); marital status \(p = 0.3\); age \(p = 0.9\); BMI \(p = 0.5\); child at home \(p = 0.6\); employment status \(p = 0.8\).

L.7.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by sedentary Stages of Change

These data indicate that a non-significant number of the TR intervention group participants who were classified as sedentary by the alternate stage category (PC &C) reported at least a 1-hour increase in total physical activity at 6-months \(\text{McNemars } \chi^2 (1, n = 179) = 3.21, p = 0.07; \text{ see Table L.28})

Table L.28: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>114 (64)</td>
<td>43 (24)</td>
<td>71 (40)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>65 (36)</td>
<td>38 (21)</td>
<td>27 (15)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount
Consistent with the results reported above, there was no significant difference reported between the sedentary (classified by alternate stage category) TR intervention or control group participants who increased their total physical activity by at least 1-hour at 6-months (OR = 1.27, 95%CI = 0.62-2.61; see Table L.29).

Table L.29: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>65 (36)</td>
<td>38 (21)</td>
<td>27 (15)</td>
<td>0.29</td>
</tr>
<tr>
<td>control group</td>
<td>78 (35)</td>
<td>41 (18)</td>
<td>37 (17)</td>
<td>0.59</td>
</tr>
</tbody>
</table>

other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the sedentary staged participants at baseline. A significant model was observed (Model Fit; $X^2 = 26.23, p < 0.001$ ($-2$ log likelihood = 160.0). The model retained gender, language spoken at home and baseline intention but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the sedentary staged participants at baseline were; i. being male (OR = 5.04, 95% CI = 2.18-11.74), ii. reporting an intention to be more active within the next month at baseline (OR = 3.70, 95% CI = 1.63-8.44). The other variable retained the model (language spoken at home) was not an independently significant predictor of change (see Table L.30).
Table L.30: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender (male)</td>
<td>1.62</td>
<td>0.43</td>
<td>0.00</td>
<td>5.04 (2.18-11.74)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>-1.51</td>
<td>0.92</td>
<td>0.10</td>
<td>0.22 (0.04-1.34)</td>
</tr>
<tr>
<td>language (English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td>1.30</td>
<td>0.42</td>
<td>0.00</td>
<td>3.70 (1.63-8.44)</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation (p = 0.6); age (p = 0.6); BMI (p = 0.2); child at home (p = 0.3); employment status (p = 0.6); education level (p = 0.1); baseline activity (p = 0.4); marital status (p = 0.2).

L.8 Maintenance of behaviour change between 2- and 6-months between the TR intervention and control groups

Out of the 185 TR intervention participants and 235 control participants followed-up at 6-months, there were 61 TR intervention participants and 55 control participants who had increased their total activity status by at least 1-hour at 2-months and maintained the increase at 6-months. The difference in proportions was significant between groups indicating that more of the intervention group participants who increased their total physical activity by 1-hour between baseline and 2-months maintained the 1-hour increase at 6-months compared to the control group ($\chi^2 (1, n = 420) = 4.27, p = 0.04$; OR = 1.61, 95% CI = 1.02-2.53).
Appendix M

Illawarra RCT
Treatment Received
& Read Results
Appendix M

The results presented in this Appendix are based on those intervention group participants who reported actually receiving and reading the self-help print intervention (see Section 5.10 and Section 6.5). Hence, the group is broadly referred to as the Treatment Received and Read (TR&R) intervention group and includes data from 161 and 124 intervention group participants in the 2- and 6-month data analysis respectively (see Table M.1).

Table M.1: Number of participants in the original intervention and control groups' and the new TR&R intervention group

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-month</th>
<th>6-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>227</td>
<td>208</td>
<td>175</td>
</tr>
<tr>
<td>TR&amp;R intervention group</td>
<td>161</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>235</td>
<td>219</td>
<td>181</td>
</tr>
</tbody>
</table>

It is acknowledged that TR&R analysis may introduce a potential bias in that participants who report receiving and reading the self-help print intervention may differ from those who do not. To determine if potential biases exist demographic and baseline Physical activity data from the two groups were compared.

Table M.2: Comparison between the TR&R intervention and control groups' mean baseline demographics and physical activity levels

<table>
<thead>
<tr>
<th></th>
<th>Sept 1997 n=235 control group</th>
<th>Sept 1997 n = 161 TR&amp;R intervention group</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender (male)</td>
<td>38.3%</td>
<td>43.5%</td>
<td>0.52*</td>
<td>0.47</td>
</tr>
<tr>
<td>age (yrs)</td>
<td>48.9 ± 5.7</td>
<td>49.1 ± 5.6</td>
<td>-0.50</td>
<td>0.62</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.09</td>
<td>1.67 ± 0.10</td>
<td>0.35</td>
<td>0.73</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>74.2 ± 14.8</td>
<td>73.6 ± 14.6</td>
<td>0.40</td>
<td>0.69</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.4 ± 4.6</td>
<td>26.2 ± 4.4</td>
<td>0.35</td>
<td>0.73</td>
</tr>
<tr>
<td><strong>Physical activity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking (hrs/wk)</td>
<td>1.44 ± 2.28</td>
<td>1.17 ± 1.33</td>
<td>1.36</td>
<td>0.18</td>
</tr>
<tr>
<td>moderate (hrs/wk)</td>
<td>1.19 ± 2.23</td>
<td>1.24 ± 2.30</td>
<td>-0.22</td>
<td>0.83</td>
</tr>
<tr>
<td>vigorous (hrs/wk)</td>
<td>0.70 ± 2.52</td>
<td>0.68 ± 2.19</td>
<td>0.05</td>
<td>0.96</td>
</tr>
<tr>
<td>total (hrs/wk)</td>
<td>3.33 ± 4.10</td>
<td>3.10 ± 3.40</td>
<td>0.60</td>
<td>0.55</td>
</tr>
</tbody>
</table>

* Yates Corrected Chi Square

This analysis was conducted as it may provide important information as to the 'real' effect of the intervention when received and used as intended.
There were no statistically significant differences found between the TR intervention and the control groups' in terms of their physical demographics and baseline physical activity levels (see Table M.2). Therefore, the two study groups were comparable.

**M.1 Background media recall and impact in the TR&R intervention group**

A similar number of health related media messages were recalled by the TR&R intervention and control groups’ at baseline, 2- and 6-months, with no significant differences noted (baseline ($X^2 (1, n = 248) = 1.25, \ p = 0.26$); 2-months ($X^2 (1, n = 215) = 0.55, \ p = 0.46$); and 6-months ($X^2 (1, n = 175) = 0.11, \ p = 0.74$); see Figure N.1).

![Figure M.1: Frequency of recalling any health messages in the TR&R intervention and control groups at baseline, 2 and 6-months](image)

There were no significant differences between the number of TR&R intervention and control group participants who recalled specific physical activity related messages at; baseline (45% versus 53%; $p = 0.38$), 2-months (39% versus 49%; $p = 0.27$), or 6-months (27% versus 28%; $p = 0.95$). Other health related media messages were recalled by both groups and are also presented in Table M.3.
### Table M.3: Unprompted message recall by the TR&R intervention and control groups at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2-months (n)</th>
<th>6-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>TR&amp;R intervention</td>
<td>29</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>54</td>
<td>67</td>
<td>34</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>TR&amp;R Intervention</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>'no ifs...no buts'</td>
<td>control</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>TR&amp;R intervention</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>'Active Over 50’s'</td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Exercise &amp; Heart</td>
<td>TR&amp;R Intervention</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>34</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>Exercise &amp; Diet</td>
<td>TR&amp;R Intervention</td>
<td>8</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>10</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Exercise &amp; Smoking</td>
<td>TR&amp;R Intervention</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>TR&amp;R Intervention</td>
<td>14</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>23</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>General Health</td>
<td>TR&amp;R Intervention</td>
<td>5</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>5</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Diet</td>
<td>TR&amp;R intervention</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>TR&amp;R intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>TR&amp;R Intervention</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>TR&amp;R intervention</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Community Events</td>
<td>TR&amp;R Intervention</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Smoking</td>
<td>TR&amp;R intervention</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>6</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Can’t Recall</td>
<td>TR&amp;R intervention</td>
<td>3</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>12</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

### M.2 Changes in reported physical activity between baseline, 2 and 6-months

Consistent with the results presented in Section 6.6.1, the TR&R intervention group increased their self-reported walking time, so much that there was a significant time as well as group x time interaction observed (see Table M.4). The time interaction was apparent between baseline and 2-months ($t = -3.60, p < 0.001$) but not between baseline and 6-months ($t = -0.82, p = 0.41$). Further analysis revealed it was the
Appendix M

TR&R intervention group who reported the significant increase in walking \( (F (1, n = 142) = 7.94, p < 0.001) \) between baseline and 2-months \( (t = -3.67, p < 0.001) \), but not between baseline and 6-months \( (t = 0.53, p = 0.60) \).

Similar results were reported for moderate intensity activity across time, but no significant group \( \times \) time interaction was observed (see Table M.4). As before the significant time effect was generated between baseline and 2-months \( (t = -4.22, p < 0.001) \) but not between baseline and 6-months \( (t = -0.64, p = 0.52) \).

Table M.4: Mean (\( \pm \) SD) physical activity times (hours per week) reported by the TR&R intervention (n = 161) and control (n = 181) groups at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>6-months</th>
<th>( F_{\text{group}} )</th>
<th>( F_{\text{time}} )</th>
<th>( F_{\text{group} \times \text{time}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>TR&amp;R</td>
<td>1.20 ±</td>
<td>1.97 ±</td>
<td>1.50 ±</td>
<td>0.45</td>
<td>7.16*</td>
<td>3.01*</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.36</td>
<td>2.37</td>
<td>1.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.44 ±</td>
<td>1.59 ±</td>
<td>1.34 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.28</td>
<td>2.18</td>
<td>1.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>TR&amp;R</td>
<td>1.26 ±</td>
<td>2.13 ±</td>
<td>1.31 ±</td>
<td>1.37</td>
<td>10.27*</td>
<td>1.74</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.37</td>
<td>2.99</td>
<td>1.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.19 ±</td>
<td>1.61 ±</td>
<td>1.33 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.23</td>
<td>2.57</td>
<td>1.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vigorous</td>
<td>TR&amp;R</td>
<td>0.68 ±</td>
<td>0.48 ±</td>
<td>0.70 ±</td>
<td>0.41</td>
<td>2.16</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.24</td>
<td>1.45</td>
<td>1.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.70 ±</td>
<td>0.40 ±</td>
<td>0.53 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.52</td>
<td>1.22</td>
<td>1.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>TR&amp;R</td>
<td>3.14 ±</td>
<td>4.57 ±</td>
<td>3.52 ±</td>
<td>1.89</td>
<td>7.76*</td>
<td>3.15*</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3.48</td>
<td>4.37</td>
<td>2.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.33 ±</td>
<td>3.60 ±</td>
<td>3.21 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.10</td>
<td>3.67</td>
<td>2.98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\* \( p \leq 0.01 \)

\# \( p \leq 0.05 \)

The vigorous activity results also showed a significant effect over time when the data were pooled across groups between baseline and 2-months \( (t = 2.16, p = 0.03) \), but the increases reported at 6-months were not significant \( (t = 0.54, p = 0.59; \) see Table M.4).

As with the Intention to Treat (ITT) results there was a significant time as well as group \( \times \) time interaction for total physical activity. The time interaction was significant between baseline and 2-months \( (t = -3.84, p < 0.001) \) but not between
baseline and 6-months ($t = -0.54, p = 0.59$). Further analysis confirmed this to be a result of the increases demonstrated by the TR&R intervention group ($F(1, n = 1.61) = 7.71, p = 0.001$), between baseline and 2-months ($t = -3.43, p < 0.001$) but not between baseline and 6-months ($t = 1.18, p = 0.24$).

Therefore, these results confirm the intervention effect reported in Section 6.6.4, in that the self-help print intervention was effective in increasing the total self-reported physical activity levels in those participants who received and read it above the increases reported by the control group at 2-months. It also confirmed that the intervention effect was not maintained up to 6-months, but supported the trend that the control group tended to decrease their total physical activity below their baseline level at 6-months, while the intervention group maintained a 23-minute increase above their baseline level.

### M.3 Proportion of the TR&R intervention group meeting a criterion of sufficient physical activity per week at baseline, 2 and 6-months

The results presented in this section are based on the same principle reported in Sections 5.8.3 and 6.7 and Appendix M, Section M.2. A significant number of TR&R intervention group participants who were not reaching the 150-minute criterion at baseline reported sufficient increases in their total physical activity to meet the criterion at the 2-month follow-up ($\chi^2(1, n = 150) = 14.75, p < 0.001$; see Table M.5). However, as reported previously there was also a significant increase in the number of control group participants meeting the criterion at 2-months (see Section 6.7). However, the TR&R intervention group were 1.64 times more likely to be meeting the 150-minute criterion at 2-months than the control group ($Yates corrected \chi^2(1, n = 385) = 4.66, p = 0.03; 95% CI = 1.04-2.57$). Indicating that those intervention group participants who reported receiving and reading the self-help print intervention were more likely to increase their physical activity above the 150-minute threshold than the control group participants at 2-months.
Table M.5: The number TR&R intervention group participating in at least 150-minutes of physical activity per week at baseline, 2 and 6-months

<table>
<thead>
<tr>
<th></th>
<th>baseline (n)</th>
<th>2-month n (%)</th>
<th>6-month n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td>&lt; 150-minutes</td>
<td>≥ 150-minutes</td>
</tr>
</tbody>
</table>

TR&R intervention group
n = 150

<table>
<thead>
<tr>
<th></th>
<th>≥ 150-minutes</th>
<th>&lt; 150-minutes</th>
<th>≥ 150-minutes</th>
<th>&lt; 150-minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline (n)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55 (36)</td>
<td>15 (10)</td>
<td>53 (35)</td>
<td>17 (11)</td>
</tr>
<tr>
<td></td>
<td>46 (31)</td>
<td>34 (23)</td>
<td>49 (33)</td>
<td>31 (21)</td>
</tr>
</tbody>
</table>

Similar results were reported at 6-months with the TR&R intervention group again demonstrating a significant number of participants were being physically activity at least 150-minutes a week (McNemars $X^2 (1, n = 150) = 14.56, p < 0.001$; see Table M.5). As with the TR intervention group analysis at 6-months there was no difference between the number of participants in each group meeting the criterion at 6-months either (Yates corrected $X^2 (1, n = 385) = 2.97, p = 0.09; OR = 1.49, 95% CI = 0.95-2.35$), despite the strong trend for more of the TR&R intervention group participants to report physical activity meeting the criterion.

M.4 Proportions expending adequate amounts of energy from physical activity at baseline, 2 and 6-months

The results presented in this Section are based on the principles reported in Sections 5.8.3, Section 6.8, and Appendix M, Section M.3. The TR&R intervention group baseline energy expenditure categories were very similar to those reported by the ITT intervention group at baseline. Hence, there was no difference between the TR&R intervention group and control group participants’ energy expenditure categories at baseline (Yates Corrected $X^2 (1, n = 420) = 0.47, p = 0.82$; see Table M.6).
Table M.6: Changes in energy expenditure categories in the TR&R intervention group between baseline, 2 and 6-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>TR&amp;R intervention group n= 150 (%)</th>
<th>2-month</th>
<th>6-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>14 (9)</td>
<td>15 (11)</td>
<td>18 (16)</td>
</tr>
<tr>
<td>Moderate</td>
<td>44 (29)</td>
<td>65 (46)</td>
<td>45 (40)</td>
</tr>
<tr>
<td>Low</td>
<td>70 (47)</td>
<td>51 (36)</td>
<td>42 (37)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>22 (15)</td>
<td>9 (6)</td>
<td>9 (8)</td>
</tr>
</tbody>
</table>

A similar proportion of the TR&R intervention group were expending adequate amount of energy from physical activity at the 2- and 6-month follow-ups as the ITT and TR intervention groups (see Table M.6, Appendix L, Table L.6 & Section 6.8). Also consistent with previous data there was significant increase in TR intervention group participants moving from the inadequate energy expenditure categories to the adequate categories between baseline and 2-months (McNemars $\chi^2 (1, n = 150) = 13.73, p < 0.001$) and baseline and 6-months (McNemars $\chi^2 (1, n = 150) = 15.41, p <0.001$; see Table L.7). However, unlike the ITT and TR analysis the TR&R intervention group were significantly more likely to be in the adequately active energy expenditure category than the control group at 2-months (Yates Corrected $\chi^2 (1, n = 240) = 4.06, p =0.04; OR = 1.77, 95% CI = 1.01-3.11$). Indicating that those intervention group participants who actually reported receiving and reading the self-help print intervention were 1.77 times more likely to be adequately active at 2-months compared to the control group.

Table M.7: Energy expenditure category change in the TR&R intervention and control groups: baseline to 2 and 6-months

<table>
<thead>
<tr>
<th>baseline energy expenditure</th>
<th>adequate energy expenditure n = 150 n (%)</th>
<th>2-month energy expenditure n = 150 n (%)</th>
<th>6-month energy expenditure n = 150 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>51 (34)</td>
<td>41 (27)</td>
<td>37 (25)</td>
</tr>
<tr>
<td>adequate</td>
<td>39 (26)</td>
<td>19 (13)</td>
<td>20 (13)</td>
</tr>
</tbody>
</table>

The difference between the two groups at 6-months was not significant (Yates Corrected $\chi^2 (1, n = 240) = 1.81, p =0.18; OR = 1.49, 95% CI = 0.85-2.61$).
M.5 Movement through the Stages of Change

As reported in Section 6.11 stage change data analysis includes only those participants for which complete data were obtained. Considering the active stages (A & M), there was greater increase in the TR&R intervention group between baseline and 6-months from 38% to 51%. This mainly resulted from a decline in participants in C and a larger proportion in M at 6-months (see Table M.8).

Table M.8: Stage distribution within the TR&R intervention group at baseline and 6-months

<table>
<thead>
<tr>
<th>Stage</th>
<th>TR&amp;R intervention group n = 142 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>15 (11)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>31 (22)</td>
</tr>
<tr>
<td>Preparation</td>
<td>38 (27)</td>
</tr>
<tr>
<td>Action</td>
<td>16 (11)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>38 (27)</td>
</tr>
<tr>
<td>Relapse</td>
<td>4 (3)</td>
</tr>
</tbody>
</table>

M.5.1 Progression through the Stages of Change by the TR&R intervention group between baseline 2 and 6-months

Data in this Section was based on the TR&R intervention group participants who progressed at least one stage between baseline and 2-months. The same principles of stage progression analysis applied (see Section 5.8.6.1).

These data revealed the TR&R intervention group participants were 1.61 times more likely to progress at least one stage by 2-months than the control group ($X^2 (1, n = 357) = 4.14, p = 0.04; 95\% \text{ CI} = 1.02-2.56; \text{see Table M.9}$).

Table M.9: A comparison between the TR&R intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention</td>
<td>89 (65)</td>
<td>49 (35)</td>
</tr>
<tr>
<td>control group</td>
<td>116 (53)</td>
<td>103 (47)</td>
</tr>
</tbody>
</table>

Stage progression between baseline and 6-months revealed that the TR&R intervention group were not significantly more likely to progress their stage than
the control group ($X^2$ (1, $n = 294$) = 2.71, $p = 0.10$; OR = 1.53, 95% CI = 1.03-2.54; see Table M.10).

### Table M.10: A comparison between the TR&R intervention and control group participants who progressed at least one stage between baseline and 6-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group n = 114</td>
<td>69 (61)</td>
<td>45 (39)</td>
</tr>
<tr>
<td>control group n = 180</td>
<td>90 (50)</td>
<td>90 (50)</td>
</tr>
</tbody>
</table>

Therefore, these results were in agreement with the ITT and TR results (see Section 6.12.1 and Appendix L, Section L.7.1), whereby significant stage progression was reported by the intervention group who reported receiving and reading the self-help print intervention over the control group at 2-months. However, contrary to previous results the TR&R intervention group maintained significant level of stage progression over the control group at 6-months. Therefore, it would appear that those participants who received and read the self-help print intervention as intended were significantly more likely to progress through the Stages of Change as opposed to the intervention group counterparts who did not recognise or read the intervention as intended.

### M.5.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 6-months by the TR&R intervention group

The TR intervention group participants who were in the inactive stages (PC, C & P) at baseline were more significantly more likely to move into the active stages (A & M) at the 2-month follow-up (McNemar's $X^2$ (1, $n = 128$) = 10.78, $p = 0.001$; see Table M.11). Furthermore the difference between the TR intervention and control group participants who moved from the inactive stages to the active stages was also significant (Yates Corrected $X^2$ (1, $n = 220$) = 4.57, $p = 0.03$), indicating that the TR&R intervention group participants who were in PC, C or P at baseline were 1.63 (95% CI = 0.92-2.89) times more likely to be in A & M at 2 months.
Table M.11: Movement from inactive to active Stages of Change within the TR&R intervention group between baseline, 2 and 6-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
<th>Stage at 6-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group*</td>
<td>PC, C &amp; P</td>
<td>42 (33)</td>
<td>34 (31)</td>
</tr>
<tr>
<td>n = 128</td>
<td>A &amp; M</td>
<td>36 (28)</td>
<td>16 (13)</td>
</tr>
<tr>
<td></td>
<td>6-months (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR&amp;R intervention group*</td>
<td>PC, C &amp; P</td>
<td>34 (31)</td>
<td>31 (29)</td>
</tr>
<tr>
<td>n = 108</td>
<td>A &amp; M</td>
<td>28 (26)</td>
<td>15 (14)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2- and 6-months with participants in Relapse removed

As with the 2-month data a significant number of the TR&R intervention group participants moved from the inactive stages at baseline to the active stages by 6-months ($\chi^2 (1, n = 108) = 6.12, p = 0.01$; see Table M.11). However, the difference between the TR intervention and control group participants who moved from the inactive stages to the active stages at 6-months was again not significant (Yates Corrected $\chi^2 (1, n = 178) = 1.40, p = 0.24$; OR = 1.55, 95% CI = 0.78-3.08).

M.5.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 6-months by the TR&R intervention group

Analysis in this section is similar to the analysis reported in Appendix K and Appendix L, Section L.8. As with the TR intervention group results, the TR intervention group participants who were in the sedentary stages (PC & C) at baseline were more significantly more likely to move into the active stages (P, A & M) at the 2-month follow-up ($\chi^2 (1, n = 128) = 3.84, p = 0.05$; see Table M.12). Furthermore the difference between the TR&R intervention and control group participants who moved from the inactive stages to the active stages was also significant (Yates Corrected $\chi^2 (1, n = 128) = 1.08, p = 0.04$), indicating that the TR&R intervention group participants who were in PC & C at baseline were 2.63 (95% CI = 0.92-2.89) times more likely to be in P, A & M at 2-months compared to the control group participants.
Consistent with the 2-month data a significant number of the TR&R intervention group participants moved from the sedentary stages (PC & C) at baseline to the active stages (P, A & M) by 6-months (McNemars $X^2 (1, n = 128) = 4.11, \ p = 0.04$; see Table M.12). However, the difference between the TR&R intervention and control group participants who moved from the inactive stages to the active stages at 6-months was not significant (Yates Corrected $X^2 (1, n = 86) = 2.08, \ p = 0.15$; OR = 2.21, 95% CI = 0.79-6.29).

These results again support the notion that those intervention group participants who actually recalled receiving and reading the self-help print intervention were significantly more likely to report more physical activity and higher Stages of Change at 2-months, and while not significant at 6-months the trend did exist.

### M.6 Changes in reported physical activity adjusted to baseline level at 2 months

Data presented in this section is comparable to the ITT results reported in Section 6.9 and Appendix M, Section M.4.

#### M.6.1 Changes in reported physical activity at 2 months adjusted to baseline level categorised by energy expenditure

There was a significant increase in the number of participants reporting at least 1-hour more physical activity at 2-months in the TR&R intervention group (43%; McNemars $X^2 (1, n = 150) = 4.99, \ p = 0.03$; see Table M.13).
Table M.13: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>58 (39)</td>
<td>17 (11)</td>
<td>41 (27)</td>
</tr>
<tr>
<td>inadequate</td>
<td>92 (61)</td>
<td>65 (43)</td>
<td>27 (18)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.

Comparisons between the inadequately active TR&R intervention and control group participants who increased their physical activity by at least 1-hour at 2-months revealed that the TR&R intervention group were 2.16 times more likely to increase their total physical activity than the control group (95% CI = 1.20-3.90; see Table M.14).

Table M.14: A comparison between the number of inadequately active TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention</td>
<td>92 (61)</td>
<td>65 (43)</td>
<td>27 (18)</td>
<td>6.86</td>
</tr>
<tr>
<td>control group</td>
<td>148 (63)</td>
<td>78 (33)</td>
<td>70 (30)</td>
<td>(0.001)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward step-wise logistic regression was again conducted on the data from the inadequately active baseline samples in each study group to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months.
All variables except for group allocation, age and education level were removed via the backward elimination method (Model Fit; $X^2 = 11.95, p < 0.001$ (-2 log likelihood = 291.7)). However, the only significant predictor of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline was being in the TR&R intervention group (OR = 2.15, 95% CI = 1.22-3.81). The other variables (age and education level) retained the model were not independently significant predictors of change (see Table M.15).

Table M.15: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>pvalue</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td>0.77</td>
<td>0.29</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>group (TR&amp;R Intervention)</td>
<td></td>
<td></td>
<td></td>
<td>2.16 (1.22-3.81)</td>
</tr>
<tr>
<td>age (&lt;50-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>age (≥50-years)</td>
<td>-0.48</td>
<td>0.29</td>
<td>0.09</td>
<td>0.62 (0.35-1.09)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.53</td>
<td>0.29</td>
<td>0.06</td>
<td>0.59 (0.33-1.04)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender ($p = 0.2$); marital status ($p = 0.8$); language ($p = 0.8$); BMI ($p = 0.4$); child at home ($p = 0.3$); employment status ($p = 0.3$); baseline activity ($p = 0.9$); baseline intention ($p = 0.6$).

M.6.2 Changes in reported physical activity at 2 months adjusted to baseline level categorised by inactive stage change

The number of TR&R intervention group participants in the inactive stages at baseline who increased their total physical activity by at least 1-hour at 2-months was not significant (McNemars $X^2(1, n = 144) = 0.88, p = 0.35$; see Table M.16).
Table M.16: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>Physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>58 (40)</td>
<td>17 (12)</td>
<td>41 (29)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>86 (60)</td>
<td>62 (43)</td>
<td>24 (17)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

However, the TR&R intervention group participants who were in PC, C & P at baseline were 2.26 times more likely to move into A & M at 2-months compared to the control group (95% CI = 1.22-4.21; see Table M.17).

Table M.17: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>86 (60)</td>
<td>62 (43)</td>
<td>24 (17)</td>
<td>7.06 (0.001)</td>
</tr>
<tr>
<td>control group</td>
<td>137 (61)</td>
<td>73 (33)</td>
<td>64 (29)</td>
<td>(&lt;0.001)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Logistic regression analysis to substantiate the above result and determine any other independent predictors* of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants. A significant model was found (Model Fit; X² = 13.31, p < 0.001 (-2 log likelihood = 269.4) with all variables except for group allocation, education level and employment removed from the model, but they were all not significant predictors of change. The only significant predictor of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants at baseline was being in the TR&R intervention group (OR = 2.42, 95% CI =

* The same variable as were used in the previous logistic regression model were entered into the models tested in this Section except that baseline activity status levels changed based on the inactive stage category baseline levels, baseline activity status (<25-minutes per week, ≥25 to 90-minutes per week and ≥90-minutes per week).
1.33-4.47). The other variables retained in the model (education and employment status) were not independently significant predictors of change (see Table M.18).

Table M.18: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td>0.89</td>
<td>0.31</td>
<td>0.00</td>
<td>2.42 (1.33-4.47)</td>
</tr>
<tr>
<td>group (TR&amp;R Intervention)</td>
<td>0.89</td>
<td>0.31</td>
<td>0.00</td>
<td>2.42 (1.33-4.47)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.59</td>
<td>0.31</td>
<td>0.05</td>
<td>0.55 (0.30-1.02)</td>
</tr>
<tr>
<td>employed (yes)</td>
<td>0.63</td>
<td>0.33</td>
<td>0.06</td>
<td>1.87 (0.98-3.59)</td>
</tr>
<tr>
<td>employed (no)</td>
<td>0.63</td>
<td>0.33</td>
<td>0.06</td>
<td>1.87 (0.98-3.59)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.2); marital status (p = 0.8); language (p = 0.9); BMI (p = 0.3); child at home (p = 0.8); baseline activity (p = 0.9); age (p = 0.4); baseline Intention (p = 0.7).

M.6.3 Changes in reported physical activity at 2 months adjusted to baseline level categorised by the sedentary Stages of Change

These data indicate that a significant number of the TR&R intervention group participants who were classified as sedentary by the alternate stage category (PC &C) reported at least a 1-hour increase in total physical activity at 2-months (McNemars $\chi^2 (1, n=144) = 15.02, p < 0.001$; see Table M.19).

Table M.19: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour (%)</th>
<th>other (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>97 (67)</td>
<td>48 (33)</td>
<td>49 (34)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>47 (33)</td>
<td>31 (22)</td>
<td>16 (11)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

However, there was no significant difference between the sedentary (classified by alternate stage category) TR intervention or control group participants who increased their total physical activity by at least 1-hour at 2-months (OR = 1.75, 95%CI = 0.78-3.97; see Table M.20).
Table M.20: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>$\chi^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>47 (33)</td>
<td>31 (22)</td>
<td>16 (11)</td>
<td>1.64</td>
</tr>
<tr>
<td>control group</td>
<td>78 (35)</td>
<td>41 (18)</td>
<td>37 (17)</td>
<td>0.20</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline. A significant model was observed (Model Fit; $\chi^2 = 13.1$, $p = 0.01$ (-2 log likelihood = 147.7))*. The model retained group allocation, gender, education and BMI, however, none of the variables were individually significantly predictors of change (see Table M.21).

Table M.21: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group (control)</td>
<td>0.70</td>
<td>0.42</td>
<td>0.10</td>
<td>1.0</td>
</tr>
<tr>
<td>group (TR&amp;R intervention)</td>
<td>0.78</td>
<td>0.44</td>
<td>0.08</td>
<td>2.19 (0.92-5.17)</td>
</tr>
<tr>
<td>gender (male)</td>
<td>0.78</td>
<td>0.44</td>
<td>0.08</td>
<td>2.19 (0.92-5.17)</td>
</tr>
<tr>
<td>gender (female)</td>
<td>0.78</td>
<td>0.44</td>
<td>0.08</td>
<td>2.19 (0.92-5.17)</td>
</tr>
<tr>
<td>BMI (normal)</td>
<td>0.78</td>
<td>0.44</td>
<td>0.08</td>
<td>2.19 (0.92-5.17)</td>
</tr>
<tr>
<td>BMI (underweight)</td>
<td>1.13</td>
<td>1.16</td>
<td>0.33</td>
<td>3.12 (0.32-30.37)</td>
</tr>
<tr>
<td>BMI (overweight)</td>
<td>-0.76</td>
<td>0.46</td>
<td>0.10</td>
<td>0.47 (0.16-1.15)</td>
</tr>
<tr>
<td>BMI (obese)</td>
<td>-0.96</td>
<td>0.55</td>
<td>0.08</td>
<td>0.38 (0.13-1.13)</td>
</tr>
<tr>
<td>education (≥10 years)</td>
<td>-0.80</td>
<td>0.42</td>
<td>0.05</td>
<td>0.45 (0.20-1.02)</td>
</tr>
<tr>
<td>education (&lt;10 years)</td>
<td>-0.80</td>
<td>0.42</td>
<td>0.05</td>
<td>0.45 (0.20-1.02)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: baseline intention ($p = 0.6$); marital status ($p = 0.8$); language ($p = 0.9$); age ($p = 0.9$); child at home ($p = 0.5$); employment status ($p = 0.2$); baseline activity ($p = 0.8$).

* The same variable as were used in the previous logistic regression model were entered into the models tested in this Section, except that baseline activity status levels changed based on the sedentary stage category baseline levels, baseline activity status (<15-minutes per week, ≥15 to 90-minutes per week and ≥90-minutes per week).
M.7 Changes in reported physical activity adjusted to baseline level at 6 months

Data presented in this section is comparable to the ITT results reported in Section 6.10.1 and TR analysis (see Section M.6).

M.7.1 A comparison between the TR&R intervention and control group participants who increased their total Physical activity by at least 1-hour between baseline and 6-months categorised by energy expenditure

There was no significant increase in the number of TR&R intervention group participants in the inadequate energy expenditure category participants reporting at least 1-hour more physical activity at 6-months in the TR&R intervention group (39%; McNemars $X^2 (1, n = 150) = 1.16, p = 0.28$; see Table M.22).

Table M.22: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>58 (39)</td>
<td>12 (8)</td>
<td>46 (31)</td>
</tr>
<tr>
<td>inadequate</td>
<td>92 (61)</td>
<td>58 (39)</td>
<td>34 (23)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Subsequently the difference between the number of inadequately active TR&R intervention group participants who increased their total physical activity by at least 1-hour between baseline and 6-months (39%) was not significantly different from the equivalent control group participants (34%; OR = 1.45, 95% CI = 0.82-2.56; see Table M.23).

Table M.23: A comparison between the number of inadequately active TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 6-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour (%)</th>
<th>other* (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group*</td>
<td>92 (61)</td>
<td>58 (39)</td>
<td>34 (23)</td>
<td>1.53</td>
</tr>
<tr>
<td>control group*</td>
<td>148 (63)</td>
<td>80 (34)</td>
<td>68 (29)</td>
<td>(0.21)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Nonetheless, backward step-wise logistic regression was conducted using only the data from the inadequately active baseline samples from each study group to determine any significant variables that may predict change (Model Fit; $X^2 = 26.98, p < 0.001$ (-2 log likelihood = 280.7). All variables except for gender, education level, language spoken at home, baseline intention and baseline activity level were removed from the model. However not all were significant predictors of change. The significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inadequately active participants at baseline were; i. being male (OR = 2.06, 95% CI = 1.11-3.89), ii. having <10-years education (OR = 1.85, 95% CI = 1.03-3.33), iii, intending to be more active in the next month at baseline (OR = 3.43, 95% CI = 1.64-7.28) and intending to be more active in the next 6-months at baseline (OR = 3.30, 95% CI = 1.53-7.06). The other variables retained in the model (language spoken at home, and baseline activity level) were not independently significant predictors of change (see Table M.24).

Table M.24: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>$p$-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>gender (male)</td>
<td>0.73</td>
<td>0.32</td>
<td>0.02</td>
<td>2.06 (1.11-3.89)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>-0.62</td>
<td>0.30</td>
<td>0.04</td>
<td>0.53 (0.30-0.97)</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (English)</td>
<td>-1.30</td>
<td>0.73</td>
<td>0.07</td>
<td>0.27 (0.07-1.14)</td>
</tr>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>1.24</td>
<td>0.38</td>
<td>0.00</td>
<td>3.44 (1.64-7.28)</td>
</tr>
<tr>
<td>intention (next 6-months)</td>
<td>1.19</td>
<td>0.39</td>
<td>0.00</td>
<td>3.30 (1.53-7.06)</td>
</tr>
<tr>
<td>baseline activity (&lt;28 min/wk)</td>
<td>0.29</td>
<td>0.37</td>
<td>0.44</td>
<td>1.33 (0.65-2.76)</td>
</tr>
<tr>
<td>baseline activity (≥28-90 min/wk)</td>
<td>-0.51</td>
<td>0.34</td>
<td>0.14</td>
<td>0.60 (0.31-1.17)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation ($p = 0.2$); marital status ($p = 0.4$); BMI ($p = 0.3$); child at home ($p = 0.8$); employment status ($p = 0.8$); baseline activity ($p = 0.5$); age ($p = 0.9$).
A comparison between the TR&R intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6 months categorised by inactive stage change

These data indicate that the TR&R intervention group participants who were in PC, C & P stages at baseline (or classified as inactive in the stage model) were significantly more likely to move into A & M (or classified as active in the stage model) at 6-months than those who were in A & M at baseline (McNemars $X^2 (1, n = 144) = 6.88, p < 0.01$; see Table M.25).

Table M.25: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>58 (40)</td>
<td>12 (8)</td>
<td>46 (32)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>86 (60)</td>
<td>56 (39)</td>
<td>30 (21)</td>
</tr>
</tbody>
</table>

other* = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

However, there was no significant difference found between the number of inactive staged TR intervention group and control group participants at baseline who reported at least a 1-hour increase in total physical activity at 6-months (OR = 1.45, 95%CI = 0.80-2.64; see Table M.26).

Table M.26: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>86 (60)</td>
<td>56 (39)</td>
<td>30 (21)</td>
<td>1.39</td>
</tr>
<tr>
<td>control group</td>
<td>137 (61.2)</td>
<td>77 (34)</td>
<td>60 (27)</td>
<td>(0.24)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward step-wise Logistic regression analysis was again conducted to determine any independent predictors of increasing total physical activity by at
least 1-hour between baseline and 6-months in the inactive staged participants change. A significant model was found (Model Fit; \( X^2 = 25.81, p < 0.001 \) (-2 log likelihood = 259.1)). All variables except for gender, education level, language spoken at home, baseline Intention and baseline activity level were removed from the model, but not all were independently significant predictors of change. Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the inactive staged participants at baseline were; i. being male (OR = 2.27, 95% CI = 1.19-4.34), ii. having <10-years education (OR = 1.85, 95% CI = 1.01-3.45) and iii. intending to be more active in the next month at baseline (OR = 3.53, 95% CI = 1.52-8.19) and intending to be more active in the next 6-months at baseline (OR = 3.33, 95% CI = 1.40-7.86) and iv. speaking English at home (OR = 5.88, 95% CI = 1.10-33.33). The other variable retained in the model (baseline activity) was not an independently significant predictor of change (see Table M.27).

Table M.27: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>gender (male)</td>
<td>0.86</td>
<td>0.33</td>
<td>0.01</td>
<td>2.05 (1.19-4.34)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>1.26</td>
<td>0.43</td>
<td>0.00</td>
<td>3.54 (1.52-8.19)</td>
</tr>
<tr>
<td>baseline intention (next 6-months)</td>
<td>1.20</td>
<td>0.44</td>
<td>0.00</td>
<td>3.33 (1.40-7.86)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (≥10-years)</td>
<td>-0.62</td>
<td>0.31</td>
<td>0.05</td>
<td>0.54 (0.29-0.99)</td>
</tr>
<tr>
<td>baseline activity (&lt;25min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (25 to 90min/wk)</td>
<td>0.11</td>
<td>0.38</td>
<td>0.78</td>
<td>1.12 (0.52-2.40)</td>
</tr>
<tr>
<td>baseline activity (≥90min/wk)</td>
<td>0.68</td>
<td>0.37</td>
<td>0.06</td>
<td>0.51 (0.25-1.05)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (English)</td>
<td>-1.76</td>
<td>0.85</td>
<td>0.04</td>
<td>0.17 (0.03-0.91)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation (\( p = 0.2 \)); marital status (\( p = 0.2 \)); age (\( p = 0.9 \)); BMI (\( p = 0.4 \)); child at home (\( p = 0.9 \)); employment status (\( p = 0.4 \)).
M.7.3 A comparison between the TR&R intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 6 months categorised by the sedentary Stages of Change

These data indicate that a non-significant number of the TR&R intervention group participants who were classified as sedentary by the alternate stage category (PC & C) reported at least a 1-hour increase in total physical activity at 6-months (McNemars $\chi^2 (1, n = 144) = 7.55, p = 0.01$; see Table M.28).

Table M.28: Proportion of the TR&R intervention group (n = 120) who increased their total physical activity by at least 1-hour between baseline and 6-months categorised by the sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>97 (67)</td>
<td>37 (26)</td>
<td>60 (41)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>47 (33)</td>
<td>31 (22)</td>
<td>16 (11)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Consistent with the results reported above, there was no significant difference reported between the sedentary (classified by alternate stage category) TR&R intervention or control group participants who increased their total physical activity by at least 1-hour at 6-months (OR = 1.75, 95%CI = 0.78-3.97; see Table M.29).

Table M.29: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour (%)</th>
<th>other* (%)</th>
<th>$\chi^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>47 (33)</td>
<td>31 (22)</td>
<td>16 (11)</td>
<td>1.64</td>
</tr>
<tr>
<td>control group</td>
<td>78 (35)</td>
<td>41 (18)</td>
<td>37 (17)</td>
<td>(0.20)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount
Consistent with the results reported above, there was no significant difference reported between the inadequately active (by alternate stage category) TR&R intervention or control group participants who increased their total physical activity by at least 1-hour (OR = 1.48; 95%CI = 0.60-3.65; see Table M.30).

Table M.30: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 6-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour (%)</th>
<th>other* (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>37 (30.8)</td>
<td>54.1</td>
<td>45.9</td>
<td>0.54</td>
</tr>
<tr>
<td>control group</td>
<td>61 (35.1)</td>
<td>44.3</td>
<td>55.7</td>
<td>(0.46)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 6-months in the sedentary staged participants at baseline. A significant model was observed (Model Fit; X² = 25.11, p < 0.001 (-2 log likelihood = 136.8; see Table M.31).

Table M.31: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td>1.55</td>
<td>0.48</td>
<td>0.00</td>
<td>4.69 (1.84-12.07)</td>
</tr>
<tr>
<td>gender (male)</td>
<td>2.32</td>
<td>1.21</td>
<td>0.06</td>
<td>10.13 (0.95-109.03)</td>
</tr>
<tr>
<td>BMI (normal)</td>
<td>-0.04</td>
<td>0.47</td>
<td>0.93</td>
<td>0.96 (0.38-2.41)</td>
</tr>
<tr>
<td>BMI (underweight)</td>
<td>0.82</td>
<td>0.59</td>
<td>0.16</td>
<td>2.28 (0.72-7.29)</td>
</tr>
<tr>
<td>BMI (obese)</td>
<td>1.57</td>
<td>0.49</td>
<td>0.00</td>
<td>4.79 (1.84-12.56)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation (p = 0.2); education (p = 0.2); marital status (p = 0.5); language (p = 0.2); age (p = 0.7); child at home (p = 0.7); employment status (p = 0.3); baseline activity (p = 0.8).
The model retained gender, BMI and baseline intention but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 6-months in the sedentary staged participants at baseline were; i. being male (OR = 4.69, 95% CI = 1.84-12.07), and ii. reporting an intention to be more active within the next month at baseline (OR = 4.79, 95% CI = 1.84-7.29). The other variable retained the model (BMI) was not an independently significant predictor of change (see Table M.31).

M.8 Maintenance of behaviour change between 2 and 6-months between the TR&R intervention and control groups

Out of the 150 TR&R intervention participants and 235 control participants followed-up at 6-months, there were 51 TR intervention participants and 55 control participants who had increased their total activity status by at least 1-hour at 2-months and maintained the increase at 6-months. The difference in proportions was significant between groups indicating that more of the intervention group participants who increased their total physical activity by 1-hour between baseline and 2-months maintained the 1-hour increase at 6-months compared to the control group ($\chi^2 (1, n = 385) = 4.63, p = 0.03; \text{OR} = 1.69, 95\% \text{CI} = 1.15-2.72$).
Appendix N

Illawarra RCT exclusion analysis results
N.1 Types of illnesses, injuries, and disabilities reported by the intervention and control groups at baseline

One hundred and two participants in the Illawarra RCT reported some type of illness, injury or disability at baseline (see Figure N.1). Only those participants were classified as having had recent surgery, chronic injury or disease or an acute musculoskeletal problem were considered to be limited in terms of their ability to participate in some form of physical activity within the previous 2 weeks. Therefore, 27 intervention and 34 control group participants' data could be excluded from baseline data analysis.

![Figure N.1: Self reported illness, injury or disability limiting physical activity in the intervention and control groups at baseline](image)

N.2 Changes in total physical activity between baseline, 2- and 6-months, in participants who reported an illness, injury or disability at baseline excluded

As an investigator one would conclude that by removing those participants reported a major illness, injury or disabilities had limited their participation in physical activity, that the group mean total physical activity levels would increase, however, was not the case. There were no significant difference between the intervention and
control groups mean baseline total physical activity, despite the intervention group showing a slightly lower mean ($t = 0.93, p = 0.36$; see Figure N.2).

![Figure N.2: Mean total physical activity time (hours/week) reported by the intervention (n=200) and control (n=201) groups (excluding participants reporting a limiting health problem) at baseline, 2 and 6-months](image)

There was no statistically significant difference between the intervention and control groups in terms of total physical activity despite the intervention group showing an obviously greater increase between the baseline and 2-month period ($F = 0.35, p = 0.55$). There was, however, a statistically significant effect of time when the data were pooled across groups ($F = 9.35, p < 0.001$), from which linear contrasts revealed a statistically significant difference between baseline and 2-months ($t = -4.14, p < 0.001$), but not between baseline and 6-months ($t = -0.66, p = 0.51$).

A statistically significant group×time interaction was also determined for total physical activity prevalence ($F = 3.34, p = 0.04$). Further analysis revealed that the intervention group showed a significant effect of time ($F = 11.87, p < 0.001$), but the control group did not. Linear contrasts of the intervention groups’ time data showed a statistically significant difference between the baseline and 2-month follow-up ($t = -3.99, p < 0.001$).
Appendix O

NSW RCT
survey instrument
Introduction

This coding manual contains the codes used during the 1997 Physical Activity Survey conducted for the Australian Sports Commission, the Queensland Department of Health and the Victorian Department of Human Services. Interviews were conducted by the Hunter Valley Research Foundation (HVRF) using a Computer Aided Telephone Interviewing (CATI) system. The CATI system directed the interview, identifying appropriate skips throughout the questionnaire.

The telephone interviews were conducted between 10 November 1997 and 15 December 1997. Attempts at contacting each respondent were generally made between the hours of 11am and 11.30pm Eastern Standard Time (EST), Monday to Friday.

Weekend interviewing was also conducted. Weekend interviewing does not typically result in a high interview completion rate, however, it does ensure a spread of contact times with each household, thereby maximising the chance of contact. This was particularly important for households who were not contactable on week days or evenings.

Other methods were employed during the survey which aimed at maximising response rates. These methods were the use of an answering machine strategy and the use of a free call (1800) number which enabled householders to contact the survey supervisor directly.

The answering machine strategy was to leave a scripted message on the householders' answering machine at various points of contact. There were two scripted messages which were used during the survey:

First message: “Good morning/afternoon/evening I am phoning on behalf of {client's name} about a physical activity study. I will try to contact you later”.

Second and subsequent messages: “Good morning/afternoon/evening I am phoning on behalf of {client's name} about a physical activity study. Could you please return my call on toll free 1800 355 534 between {appropriate time - allowing for time zone differences between states}”.

Apart from leaving the toll free number on answering machines, it was also provided to any householder/respondent who wanted to phone the HVRF to speak directly with the Survey Supervisor. The toll free number was manned for approximately 10 hours on each day of interviewing and an answering machine after interviewing hours.

* There were only slight variations to the content of the 2- and 8-month follow-up surveys, including the addition of the self-help print intervention process evaluation questions (see Appendix I) and the removal of the weight question (Q.19 in baseline survey) in the 2-month survey. The weight question was again added in to the 8-month survey.
Appendix O

The use of the answering machine strategy combined with the toll free number are thought to have been significant influences in breaking through the answering machine barrier and for converting soft refusals into completed interviews. By speaking directly to the Survey Supervisor, householders who were unsure about participation in the survey could ask questions before providing consent. A further advantage of this system was that the Survey Supervisor could identify the correct respondent in the household. This information was then provided to an interviewer who, on subsequent contact with the household, could ask for the respondent by name.

2 Response rate database:

<table>
<thead>
<tr>
<th>Content</th>
<th>Response rate code for each call attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codes used:</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Completed interview</td>
</tr>
<tr>
<td>2</td>
<td>Refusal</td>
</tr>
<tr>
<td>3</td>
<td>Terminated interview</td>
</tr>
<tr>
<td>4</td>
<td>Call back</td>
</tr>
<tr>
<td>5</td>
<td>Not answering</td>
</tr>
<tr>
<td>6</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>7</td>
<td>Answering machine</td>
</tr>
<tr>
<td>8</td>
<td>Person moved - possible leads being followed</td>
</tr>
<tr>
<td>9</td>
<td>Business</td>
</tr>
<tr>
<td>10</td>
<td>Disconnected</td>
</tr>
<tr>
<td>11</td>
<td>Engaged</td>
</tr>
<tr>
<td>12</td>
<td>Fax</td>
</tr>
<tr>
<td>14</td>
<td>Language problem</td>
</tr>
<tr>
<td>17</td>
<td>Call back - incomplete interview</td>
</tr>
<tr>
<td>22</td>
<td>Refusal - household</td>
</tr>
<tr>
<td>40</td>
<td>Second letter to be sent</td>
</tr>
<tr>
<td>44</td>
<td>Call back - household</td>
</tr>
<tr>
<td>66</td>
<td>Unavailable for survey period</td>
</tr>
</tbody>
</table>

3 Completed interview database: AUS449.DBF

PHONE NO. IS (Phone number) Hello, is this (phone number) Good afternoon/evening, my name is .......... I am calling on behalf of the {client's name} We are conducting a “regional/national” survey on physical activity. The research results will be important for the planning of future health and exercise programs in your local area. Your telephone number has been selected randomly from the White Pages. A member of your household will be asked to answer a few questions over the phone. Could I ask how many people in your household are aged between 18 and 75 years of age Could I speak to the person AGED BETWEEN 18 AND 75 who had the last birthday? Would that be yourself? [If it is clear that the speaker is not aged between 18 and 75, omit this question, say `who would that be?’ or similar] *The “answering machine barrier” refers to the difficulty in making direct contact with the householder to obtain consent to participate in the survey. Many households use the answering machine to screen telephone calls, which, for telephone interviewers, can sometimes result in no direct contact with any person living in the household. The messages left by the HVRF were designed to generate household interest in the study, and, ultimately, to encourage householders using the answering machine as a screening device to make direct contact with the Foundation.*
Appendix O

[If necessary, explain why we must speak to the person who had the last birthday. We must use a random factor (like next birthday) to avoid skewing the survey results. In many households one person usually answers the phone - we need to sample everyone's opinion.]

[IF NOT - when required person is on phone]
Good afternoon/evening, my name is ........ I am calling on behalf of the "sponsor's name".
We are conducting a "regional/national" survey on physical activity, to find out about the health of the Australian population. The research results will be important for the planning of future health and exercise programs in your local area. Your telephone number has been selected randomly from the White Pages. All that is involved is answering a few questions over the phone.
The survey should take NO MORE THAN 15 minutes. If there are any questions you prefer not to answer just say so. Would you help us with this survey?

[IF NO] Thank you very much for your time.

Qa  Have you heard or seen any messages about exercise or physical activity IN THE PAST MONTH?
Content:  
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Don't know</td>
</tr>
<tr>
<td>9</td>
<td>Refused</td>
</tr>
</tbody>
</table>

[Skip: if Qa not equal to 1, go to Qb]

Qb  What is one message that you remember?
Content:  Message remembered
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>Don't know / can't recall</td>
</tr>
</tbody>
</table>

[Skip: if b = 99, go to Qc]

Qc  Do you remember any other messages about exercise or physical activity that you saw or heard in the last month?
Content:  Other messages which were heard or seen.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>Don't remember any other messages</td>
</tr>
</tbody>
</table>

Q1. ON AVERAGE, how many hours of TV/video do you watch per day?
Content:  Minutes
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

[INTERVIEWER: THIS IS TOTAL HOURS - IF NECESSARY DIVIDE TOTAL WEEKLY HOURS BY 7]

We would like to ask you about the physical activity you did in the last week:

Q2. IN THE LAST WEEK how many times have you walked continuously, for at least 10 minutes, for recreation/exercise or to get to or from places?
Content:  Number of times
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>Don't know - use as an absolute last resort</td>
</tr>
</tbody>
</table>

[Skip: if Q2 = 0, go to Q3]

Q2b. In total, how much time do you estimate you spent walking in this way IN THE LAST WEEK?  [INTERVIEWER: THIS IS `CONTINUOUS' WALKING]
Content:  Minutes
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Don't know</td>
</tr>
</tbody>
</table>

Content:  Hours
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>777</td>
<td>Don't know</td>
</tr>
</tbody>
</table>
Q3 Can you tell me on how many days OVER THE PAST WEEK you climbed AT LEAST ONE flight of stairs? [MINIMUM FLIGHT = 10 STEPS - SAME FOR LADDERS]

Content: Number of days, in last the week, on which at least one flight of stairs was climbed

98 = Don't know
99 = Refused

Skip: If Q3 = 0 go to Q4

Q3b On those days, how MANY flights of stairs did you climb ON AVERAGE? [MINIMUM FLIGHT = 10 STEPS - SAME FOR LADDERS]

The next question does not include gardening.

Q4. IN THE LAST WEEK how many times did you do any vigorous household chores which made you breathe harder or puff and pant?

Content: Number of times, in the last week, in which vigorous household chores were done.

99 = Don't know - use as an absolute last resort

Skip: If Q4=0, go to Q5

Q4b. How long would you estimate that you spent doing these vigorous household chores IN THE LAST WEEK?

Content: Minutes

77 = Don't know

Content: Hours

777 = Don't know

Q5. IN THE LAST WEEK how many times did you do any vigorous gardening or heavy work around the yard which made you breathe harder or puff and pant?

Content: Number of times, in the last week, spent doing vigorous activity in the yard

99 = Don't know - use as an absolute last report

Skip: If Q5=0, go to Q6

Q5b. IN THE LAST WEEK how long would you estimate that you spent doing vigorous gardening or heavy work around the yard?

Content: Minutes

77 = Don't know

Content: Hours

777 = Don't know

The next question excludes household chores or gardening:

Q6. IN THE LAST WEEK, how many times did you do any vigorous physical activity which made you breathe harder or puff and pant? (eg. tennis, jogging, cycling, keep fit exercises)

Content: Number of times doing vigorous physical activity

99 = Don't know - use only as an absolute last resort

Skip: If Q6=0, go to Q7

Q6b. How long would you estimate that you spent doing this vigorous physical activity IN THE LAST WEEK?

Content: Minutes

77 = Don't know

Content: Hours

777 = Don't know

This question excludes household chores or gardening:

Q7. IN THE LAST WEEK how many times did you do any other more moderate physical activity that you haven't already mentioned? (eg. lawn bowls, golf, gentle swimming, etc)

Content: Number of times doing moderate activities not already mentioned

99 = Don't know - use only as an absolute last resort

Skip: If Q7=0, go to Q8

Q7b. What do you estimate was the total time that you spent doing these activities IN THE LAST WEEK?
Appendix O

The next three questions are about your average WEEKLY level of activity IN THE LAST SIX MONTHS:

[Interviewer - Make sure this is clear to the respondent]

[Previous week: Hours & Minutes appear in case respondent says last week was an average week]

Q8. On average, IN THE LAST SIX MONTHS how much time did you spend each week walking for recreation/exercise or to get to or from places?

Content: Minutes
77=Don't know

Content: Hours
777=Don't know

The next question excludes household chores or gardening:

[Previous week: Hours & Minutes appear in case respondent says last week was an average week]

Q9. On average, IN THE LAST SIX MONTHS how much time did you spend each week doing vigorous physical activity which made you breathe harder or puff and pant? (eg tennis, jogging, cycling, keep fit exercises, etc)

Content: Minutes
77=Don't know

Content: Hours
777=Don't know

The next question excludes household chores or gardening:

Q10. On average, IN THE LAST SIX MONTHS how much time did you spend each week doing any other more moderate physical activity that you haven't already mentioned? (eg lawn bowls, golf, gentle swimming, etc)

[Previous week: Hours & Minutes appear in case respondent says last week was an average week]

Content: Minutes
77=Don't know

Content: Hours
777=Don't know

[RANDOM ordering of the following statements]

The following statements are about the amount of exercise you intend to do in the near future.

Q11 Which one best describes how you feel at present? [Read statements]

Enter 1 only for the statement chosen by respondent

You do NOT intend to be more active than you have been over the last week.

You intend to be more active over the NEXT MONTH than you have been over the last week.

You intend to become more active sometime over the NEXT SIX MONTHS than you have been over the last week.

Content:
1= You do NOT intend to be more active than you have been over the last week.
2= You intend to be more active over the NEXT MONTH than you have been over the last week.
3= You intend to become more active sometime over the NEXT SIX MONTHS than you have been over the last week.
9= Don't know

[RANDOM ordering of the following statements]
Q12. To what extent do you agree or disagree with the following statements about physical activity and health? [Read out scale]

Q19P1 Taking the stairs at work or generally being more active for at least 30 minutes each day is enough to improve your health

Q19P2 Half an hour of brisk walking on most days is enough to improve your health

Q19P3 To improve your health it is essential for you to do vigorous exercise for at least 20 minutes each time, 3 times a week

Q19P4 Exercise doesn't have to be done all at one time - blocks of 10 minutes are okay

Q19P5 Moderate exercise that increases your heart rate slightly can improve your health

Content:
1= Strongly agree
2= Agree
3= Neither agree nor disagree
4= Disagree
5= Strongly disagree
6= Don't know - do not read out
9= Refused - do not read out

[RANDOM ordering of the following statements]

We would like to find out how confident you are to exercise in certain situations.

Q13. What confidence rating best describes how you feel in the following situations? [Read out scale]

QN13P1 You could exercise when you are tired

QN13P2 You could exercise when you are in a bad mood

QN13P3 You could exercise when you feel you don't have time

Content:
1= Not at all confident
2= Slightly confident
3= Moderately confident
4= Very confident
5= Extremely confident
9= Refused

Q14. How supportive is YOUR FAMILY towards you participating in exercise/physical activity? [Read out scale]

Content:
1= Very much against
2= Against
3= Neither against nor supportive
4= Supportive
5= Very supportive
8= Not applicable
9= Refused

Q15. How supportive are YOUR FRIENDS towards you participating in exercise/physical activity? [Read scale]
Finally a few questions to help classify your answers

Q16. What is your sex? [OBSERVE OR ASK]

Content:  
1= Male  
2= Female  
9= Refused

Q17. Could I ask your age please?

Content: Age in years

Q18. What is your MARITAL STATUS?

Content:  
1= Married/ Defacto  
2= Single  
3= Widowed  
9= Refused

Q19. What is your approximate weight in pounds, stones, or kilograms?

Content: Stone  
Min = 4 stone  
77 = Don’t know  
777 = Don’t know

Content: Kilograms  
Min= 20 Kilograms  
Max= 200 kilograms  
777= Don’t know

Q20. What is your approximate height in feet & inches or cms?

Content: Feet  
Min = 3 feet  
Max = 7 feet  
77 = Don’t know  
777 = Don’t know

Content: Centimetres  
Min= 90 cm  
777= Don’t know

Q21. How MANY people UNDER 18 reside at your home?

Content: Number of people under 18 living in household

Q22. How many children AGED 5 AND UNDER reside at your home?

Content: Number of children aged 5 and under living in household
Q23. How many adults aged between 18 and 75, including yourself, live in your household?
Content: Number of people aged between 18 and 75 living in household

Q24. What is the highest level of education you have COMPLETED?
Content:
1= Never attended school, some primary school
2= Completed Primary school
3= Some High school
4= School certificate/Intermediate/Year 10/4th form
5= HSC/Leaving/Year 12/6th form
6= TAFE certificate/diploma
7= University, CAE or other tertiary institution degree
Other [type in answer]

Q25. What is your current occupation?
Content:
1= Manager/Administrator
2= Professional/Para-professional
3= Tradesperson
4= Clerk
5= Salesperson and Personal Service Worker
6= Plant and Machine Operator/Driver
7= Labourer
8= Unemployed
9= Home duties
10= Retired
11= Student
Other [type in if unable to classify]

Q26. What language do you usually speak at home?
Content:
1= English
2= Arabic
3= Cantonese
4= Croatian
5= Dutch
6= Filipino
7= French
8= German
9= Greek
10= Hindi
11= Hungarian
12= Italian
13= Lebanese
14= Macedonian
15= Maltese
16= Mandarin
17= Polish
18= Russian
19= Serbian
20= Slovene
21= Spanish
22= Vietnamese
23= Other
99= Refused

Q27. What is your postcode?
Content: Postcode

Q28. What suburb do you live in?

Q29 Would you be willing to participate in a similar survey in the future?
Content:
Appendix O

1= Yes
2= No

Could I have your full name & address so we can let you know when we want to talk with you again. These details will NOT be kept with your answers.

Content: Surname
Content: First name or initials

How do you prefer letters to you to be addressed?

Content: Title  99=Only contact by phone
Content: Street address  99=Only contact by phone
Content: Suburb  99=Only contact by phone
Content: Postcode
Content: STD code
Content: Phone number for re-contact
Appendix P

NSW RCT
supplementary results
### P.1 Representativeness of the study sample

Table P.1: Physical and social demographic comparisons between the original NSW health sample 1997 (n = 2009) and subsequent NSW RCT samples

<table>
<thead>
<tr>
<th>Physical demographics*</th>
<th>November 1997 n = 2009</th>
<th>March 1998 n = 1185</th>
<th>March 1998 n = 719</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>years</td>
<td>42.1 ± 9.8</td>
<td>42.4 ± 9.6</td>
</tr>
<tr>
<td>height</td>
<td>metres</td>
<td>1.70 ± 0.10</td>
<td>1.70 ± 0.11</td>
</tr>
<tr>
<td>mass</td>
<td>kilograms</td>
<td>72.5 ± 15.2</td>
<td>73.6 ± 15.9</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>Kg/M²</td>
<td>25.0 ± 4.2</td>
<td>25.4 ± 4.8</td>
</tr>
</tbody>
</table>

| Social demographics*   | %                       | %                    | %                   |
| gender                 |                         |                     |                    |
| male                   | 43.4                    | 42.5                | 36.4               |
| female                 | 56.6                    | 57.5                | 64.6               |
| marital status         |                         |                     |                    |
| married/defacto        | 72.0                    | 76.0                | 75.9               |
| single/widow           | 28.0                    | 24.0                | 24.0               |
| child at home          |                         |                     |                    |
| yes                    | 20.1                    | 20.7                | 22.4               |
| no                     | 79.9                    | 79.3                | 77.6               |
| education level        |                         |                     |                    |
| < 10 years             | 34.7                    | 32.4                | 36.9               |
| ≥ 10 years             | 65.3                    | 67.6                | 63.0               |
| occupation             |                         |                     |                    |
| manager/professional   | 36.5                    | 39.0                | 35.9               |
| trades person          | 8.1                     | 8.5                 | 8.6                |
| clerk                  | 10.0                    | 9.8                 | 10.7               |
| sales/personal service | 12.0                    | 10.5                | 10.4               |
| driver/labourer        | 8.5                     | 8.4                 | 8.2                |
| home duties            | 17.2                    | 17.2                | 20.7               |
| no occupation*         | 7.7                     | 6.3                 | 5.5                |
| main language          | English                 | 94.0                | 95.8                | 95.9               |
| spoken at home         | other                   | 6.0                 | 4.2                 | 4.1                |

* all data from the original 1997 data set

# consists of students, unemployed and retired occupations
Table P.2: Mean physical activity data comparisons between the original NSW health sample, follow-up sample, the NSW RCT sample

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>November 1997 n=2009</th>
<th>March 1998 n=1185</th>
<th>March 1998 n=719</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>2.2 ± 2.8</td>
<td>2.3 ± 2.3</td>
<td>1.7 ± 2.5</td>
</tr>
<tr>
<td>moderate</td>
<td>0.8 ± 2.1</td>
<td>0.8 ± 2.1</td>
<td>0.40 ± 1.3</td>
</tr>
<tr>
<td>vigorous</td>
<td>1.2 ± 2.6</td>
<td>1.3 ± 2.6</td>
<td>0.46 ± 1.4</td>
</tr>
<tr>
<td>total</td>
<td>4.2 ± 4.6</td>
<td>4.4 ± 4.7</td>
<td>2.6 ± 3.3</td>
</tr>
</tbody>
</table>

* all data based on the original 1997 data-set
## P.2 Background media influences

Table P.3: Unprompted message recall by the intervention and control groups: baseline, 2 and 8 months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>Baseline (n)</th>
<th>2 months (n)</th>
<th>8 months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>intervention</td>
<td>58</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>control*</td>
<td>51</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>‘no ifs...no buts’</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>26</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>‘Active Over 50’s’</td>
<td>control</td>
<td>29</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>‘Exercise: take it regularly not seriously’</td>
<td>control</td>
<td>-</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Exercise and Heart</td>
<td>intervention</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>5</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Exercise and Diet</td>
<td>intervention</td>
<td>5</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>intervention</td>
<td>58</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>61</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>General Health</td>
<td>intervention</td>
<td>2</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Diet</td>
<td>intervention</td>
<td>2</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>intervention</td>
<td>4</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>intervention</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>intervention</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Community Events #</td>
<td>intervention</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Smoking</td>
<td>intervention</td>
<td>1</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Can’t Recall</td>
<td>intervention</td>
<td>32</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>42</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

* intervention group n = 361.
*# control group n = 358.
Appendix Q

NSW RCT
Movement through the Stages of Change
Appendix Q

The results reported in Sections Q.1 and Q.2 of this Appendix were based on movement through the Stage of Change from the inadequately active stages (PC, C & P) to the adequately active stages (A & M) between baseline, 2- and 6-months. These results replicate the analysis conducted in the Illawarra RCT (see Appendix K, Sections K.1 and K.2). Whereas, the results reported in Sections Q.3 and Q.4 of this Appendix were based on movement through the Stages of Change from the sedentary stages (PC & C) to the active stages (P, A & M) between baseline, 2- and 6-months and replicate the Illawarra RCT analysis presented in Appendix K, Sections K.3 and K.4.

Q.1 Movement through the Stages of Change from the inactive stages to the active stages between baseline and 2-months

A non-significant number of the intervention group participants moved from the inactive stages (PC, P & P; n= 53) to the active stages (A & M) between baseline and 2-months (McNemars \(X^2(1, n = 309) = 0.04, p = 0.84\); see Table Q.1). Similar results were observed in the control group where again only 53 participants from the inactive stages moved to the active stages between baseline and 2-months (McNemars \(X^2(1, n = 305) = 0.36, p = 0.55\); see Table Q.1).

Table Q.1: Movement from inactive to active Stages of Change within the intervention and control groups between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A &amp; M</td>
<td>PC, C &amp; P</td>
</tr>
<tr>
<td>intervention group*</td>
<td>PC, C &amp; P</td>
<td>53 (17)</td>
<td>169 (55)</td>
</tr>
<tr>
<td>n = 309</td>
<td>A &amp; M</td>
<td>37 (12)</td>
<td>50 (16)</td>
</tr>
<tr>
<td>control group*</td>
<td>PC, C &amp; P</td>
<td>53 (17)</td>
<td>166 (54)</td>
</tr>
<tr>
<td>n = 305</td>
<td>A &amp; M</td>
<td>40 (13)</td>
<td>46 (15)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Subsequently, there was no significant difference observed between the two study groups inactive staged participants at baseline who moved into the active stages between baseline and 2-months (Yates Corrected \(X^2(1, n = 441) = 0.00, p = 0.98\); OR = 0.98, 95% CI = 0.61-1.56).
Q.1.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by the inactive Stages of Change

This Section examines the difference between those participants who were in the active stages (A & M) at baseline compared to those participants who were in the inactive stages (PC, C & P) at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months. There was a significant difference between the number of the inactive staged participants at baseline and active staged participants at baseline who report at least a 1-hour increase in total physical activity between baseline and 2-months in both the intervention (McNemar's $X^2 (1, n = 345) = 116.95, p < 0.001$) and control groups (McNemar's $X^2 (1, n = 342) = 120.29, p < 0.001$; see Table Q.2).

Table Q.2: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by the inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>98 (28)</td>
<td>14 (4)</td>
<td>84 (24)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>247 (72)</td>
<td>91 (26)</td>
<td>156 (45)</td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>97 (28)</td>
<td>13 (4)</td>
<td>84 (25)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>245 (72)</td>
<td>88 (26)</td>
<td>157 (46)</td>
</tr>
</tbody>
</table>

*other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Subsequent analysis between the two study groups inactive participants at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months revealed no statistically significant difference (OR = 1.04, 95% CI = 0.71-1.53; see Table Q.3).
Table Q.3: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by &gt;=1-hour n (%)</th>
<th>other* n (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>247 (72)</td>
<td>91 (26)</td>
<td>156 (45)</td>
<td>0.14</td>
</tr>
<tr>
<td>control group</td>
<td>245 (72)</td>
<td>88 (26)</td>
<td>157 (46)</td>
<td>(0.91)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward logistic regression* was conducted to determine and significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants (Model Fit; $X^2 = 28.01, p < 0.001$ (-2 log likelihood = 600.4). The model retained marital Status, Education, baseline intention, and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline were; i. baseline Intention to be more active within the next month (OR = 2.15, 95% CI = 1.28-3.56), ii. Being single (OR = 1.61, 95% CI = 1.03-2.56), ii. <10-years education level (OR = 1.49, 95% CI = 1.01-2.22), iii. baseline activity level <20-minutes (OR = 2.63, 95% CI = 1.56-4.17) compared to baseline activity ≥80-minutes per week. other variables retained the model were not independently significant (see Table Q.4).

* The same variables as were used in previous NSW RCT logistic regression modelling were also entered into the models tested in this Section except that baseline activity status levels changed based on the stage category baseline levels. Dichotomous variables entered in to the model included; group allocation (intervention or control group), gender (male and female), marital status (those married or in a defacto relationship and those single or widowed), language (those who speak English at home and other languages), age (≤50 years and >50 years), children living at home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded trichotonously were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), BMI (underweight, normal weight, overweight and obese), baseline activity status (<20-minutes per week, ≥20 to 80-minutes per week and ≥80-minutes per week).
Table Q.4: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive baseline sample categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline intention (none)</td>
<td>0.77</td>
<td>0.26</td>
<td>0.00</td>
<td>2.15 (1.28-3.56)</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>0.42</td>
<td>0.26</td>
<td>0.12</td>
<td>1.52 (0.91-2.53)</td>
</tr>
<tr>
<td>baseline intention (next 6-months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>education level (&lt;10-years)</td>
<td>-0.40</td>
<td>0.20</td>
<td>0.05</td>
<td>0.67 (0.45-0.99)</td>
</tr>
<tr>
<td>education level (≥10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>marital status (single)</td>
<td>-0.48</td>
<td>0.23</td>
<td>0.03</td>
<td>0.62 (0.39-0.97)</td>
</tr>
<tr>
<td>marital status (couple)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td>-0.43</td>
<td>0.23</td>
<td>0.07</td>
<td>0.65 (0.41-1.02)</td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥80 min/wk)</td>
<td>-0.95</td>
<td>0.25</td>
<td>0.00</td>
<td>0.38 (0.24-0.64)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.8); language (p = 0.6); age (p = 0.9); BMI (p = 0.9); child at Home (p = 0.5); employment status (p = 0.7); group allocation (p = 0.7).

Q.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline and 8-months

Again a non-significant number of the intervention group participants moved from the inactive stages (PC, P & P; n = 65) to the active stages (A & M) between baseline and 8-months (McNemars $\chi^2 (1, n = 286) = 1.03, p = 0.31$; see Table Q.5). Similar results were observed in the control group where again only 52 participants from the inactive stages moved on the active stages between baseline and 8-months (McNemars $\chi^2 (1, n = 297) = 2.56, p = 0.11$; see Table Q.5).

Table Q.5 Movement from inactive to active Stages of Change within the intervention and control groups between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 8-months n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PC, C &amp; P</td>
<td>A &amp; M</td>
</tr>
<tr>
<td>intervention group*</td>
<td></td>
<td>65 (23)</td>
</tr>
<tr>
<td>n = 286</td>
<td></td>
<td>30 (10)</td>
</tr>
<tr>
<td>control group*</td>
<td></td>
<td>52 (18)</td>
</tr>
<tr>
<td>n = 297</td>
<td></td>
<td>49 (16)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Subsequently, there was no significant difference observed between the two study groups inactive participants by stage at baseline who moved into the active stages...
between baseline and 8-months (Yates Corrected $X^2 (1, n = 415) = 2.52, p = 0.11$; OR = 1.45, 95% CI = 0.92-2.28).

**Q.2.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by the inactive Stages of Change**

This Section examines the difference between those participants who were in the active stages (A & M) at baseline compared to those participants who were in the inactive stages (PC, C & P) at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months. There was a significant difference between the number of the inactive staged participants at baseline and active staged participants at baseline who report at least a 1-hour increase in total physical activity between baseline and 8-months in both the intervention (McNemar’s $X^2 (1, n = 345) = = 92.92, p < 0.001$) and control groups (McNemar’s $X^2 (1, n = 342) = 107.21, p < 0.001$; see Table Q.6).

**Table Q.6: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by active verses inactive Stages of Change**

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>98 (28)</td>
<td>11 (3)</td>
<td>87 (25)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>247 (72)</td>
<td>123 (36)</td>
<td>124 (36)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>97 (28)</td>
<td>17 (5)</td>
<td>80 (23)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>245 (72)</td>
<td>92 (27)</td>
<td>153 (23)</td>
</tr>
</tbody>
</table>

*other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Further analysis between the intervention and control groups inactive participants by stage at baseline, revealed the inactive intervention group participants at baseline were 1.65 times more likely to increase their total activity status by at least 1-hour between baseline and 8-months than the control groups inadequately active sample (95% CI = 1.13-2.40; see Table Q.7).
Table Q.7: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>247 (72)</td>
<td>123 (36)</td>
<td>124 (36)</td>
<td>7.01</td>
</tr>
<tr>
<td>control group</td>
<td>245 (72)</td>
<td>92 (27)</td>
<td>153 (23)</td>
<td>(&lt;0.001)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward logistic regression was again conducted using only the data from the inadequately active baseline sample to determine any significant predictors of increasing physical activity by at least 1-hour between baseline and 8-months (Model Fit; \(X^2 = 57.05, p < 0.001\) (-2 log likelihood = 601.5)). The model retained group allocation, language spoken at home, baseline intention, and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were: i. being in the intervention group (OR = 1.97, 95% CI = 1.13-2.46), ii. baseline Intention to be more active within the next month (OR = 2.03, 95% CI = 1.22-3.39), iii. baseline activity level <20-minutes (OR = 4.34, 95% CI = 2.63-7.14) compared to baseline activity ≥80-minutes per week. Other variables retained the model were not independently significant (see Table Q.8).

Table Q.8: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive baseline sample categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>0.51</td>
<td>0.20</td>
<td>0.01</td>
<td>1.671 (1.13-2.46)</td>
</tr>
<tr>
<td>group allocation (intervention)</td>
<td>1.12</td>
<td>0.58</td>
<td>0.05</td>
<td>3.06 (0.98-9.55)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>0.71</td>
<td>0.26</td>
<td>0.01</td>
<td>2.03 (1.22-3.39)</td>
</tr>
<tr>
<td>language (English)</td>
<td>0.24</td>
<td>0.25</td>
<td>0.35</td>
<td>1.27 (0.78-2.08)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td>-0.37</td>
<td>0.23</td>
<td>0.10</td>
<td>0.69 (0.44-1.08)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td>-1.47</td>
<td>0.26</td>
<td>0.00</td>
<td>0.23 (0.14-0.38)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (\(p = 0.1\)); age (\(p = 0.6\)); employment status (\(p = 0.8\)); child at home (\(p = 0.2\)); BMI (\(p = 0.8\)); marital status (\(p = 0.6\)); education level (\(p = 0.4\)).
Q.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline and 2-months

Stage movement within the intervention group between baseline and 2-months as defined by sedentary stages (PC & C) verses active Stages (P, A & M) was not significant (McNemars $X^2 (1, n = 309) = 0.00, p = 1.00$; see Table Q.9). Similar non-significant results were observed in the control groups’ stage movement between baseline and 8-months (McNemars $X^2 (1, n = 305) = 0.04, p = 0.85$; see Table Q.9).

Table Q.9: Movement from sedentary to more active Stages of Change within the intervention and control groups between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 2-months n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PC &amp; C</td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>intervention group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 309</td>
<td>58 (19)</td>
<td>82 (27)</td>
</tr>
<tr>
<td></td>
<td>112 (36)</td>
<td>57 (18)</td>
</tr>
<tr>
<td>control group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n = 305</td>
<td>56 (18)</td>
<td>83 (27)</td>
</tr>
<tr>
<td></td>
<td>113 (37)</td>
<td>53 (17)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Subsequently, there was no significant difference observed between the two study groups sedentary staged participants who moved into the active stages between baseline and 2-months (Yates Corrected $X^2 (1, n = 279) = 0.11, p = 0.94; OR = 1.05, 95% CI = 0.63-1.74).

Q.3.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by the sedentary Stages of Change

This Section examines the difference between those participants who were in the active stages (P, A & M) at baseline compared to those participants who were in the sedentary stages (PC & C) at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months. There was a significant difference between the number of sedentary staged participants at baseline and active staged participants at baseline who report at least a 1-hour increase in total physical activity between baseline and 2-months reported at least a 1-hour increase in total physical activity between baseline and 2-months in both
the intervention (McNemar's $\chi^2$ (1, $n = 345$) = 15.59, $p < 0.001$) and control group participants (McNemar's $\chi^2$ (1, $n = 342$) = 17.11, $p < 0.001$; see Table Q.10).

Table Q.10: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary verses active Stage of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by $\geq$ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>190 (55)</td>
<td>52 (15)</td>
<td>138 (40)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>155 (45)</td>
<td>53 (15)</td>
<td>102 (30)</td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>189 (55)</td>
<td>50 (15)</td>
<td>139 (41)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>153 (45)</td>
<td>51 (15)</td>
<td>102 (30)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

A comparison between the two study groups sedentary participants at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months revealed no statistically significant difference between the intervention and control groups (OR = 1.04, 95% CI = 0.63-1.71; see Table Q.11).

Table Q.11: A comparison between the number of sedentary intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by $\geq$ 1-hour (%)</th>
<th>other* (%)</th>
<th>$\chi^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>155 (45)</td>
<td>53 (15)</td>
<td>102 (30)</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>153 (45)</td>
<td>51 (15)</td>
<td>102 (30)</td>
<td>(0.97)</td>
<td></td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward logistic regression was again conducted using only the data from the sedentary baseline participants from each group (Model Fit; $\chi^2 = 11.61$ $p = 0.003$
Appendix Q

(-2 log likelihood = 368.9)*. The model retained education level and baseline intention. However, the only significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline was education level <10-years (OR = 2.17, 95% CI = 1.28-3.57). Baseline intention within the next month was not independently significant (see Table Q.12).

Table Q.12: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously sedentary baseline sample categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>0.48</td>
<td>0.26</td>
<td>0.06</td>
<td>1.62 (0.98-2.72)</td>
</tr>
<tr>
<td>education level (&lt;10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education level (≥10-years)</td>
<td>-0.76</td>
<td>0.25</td>
<td>0.003</td>
<td>0.46 (0.28-0.78)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.8); marital status (p = 0.3); language (p = 0.6); age (p = 0.9); BMI (p = 0.8); child at home (p = 0.3); employment status (p = 0.6); baseline activity status (p = 0.2); group allocation (p = 0.7).

Q.4 Movement through the Stages of Change from the sedentary stages to the active stages between baseline and 8-months

Stage movement within the intervention group between baseline and 8-months as defined by sedentary stages (PC & C) verses active Stages (P, A & M) was not significant (McNemars $X^2 (1, n = 286) = 0.61, p = 0.43$; see Table Q.13). Similar non-significant results were observed in the control group stage movement between baseline and 8-months (McNemars $X^2 (1, n = 297) = 1.87, p = 0.17$; see Table Q.13).

The same variables as before were entered in the model except that the trichotomous distribution of baseline activity level was altered to suit the sedentary stage distribution baseline activity status (<15-minutes per week, ≥15 to 60 minutes per week and ≥60-minutes per week).
Table Q.13: Movement from sedentary to active Stages of Change within the intervention and control groups between baseline and 8-months

<table>
<thead>
<tr>
<th>Stage at baseline</th>
<th>Stage at 8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>intervention group*</td>
<td></td>
</tr>
<tr>
<td>n = 286</td>
<td></td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>71 (25)</td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>100 (35)</td>
</tr>
<tr>
<td>control group*</td>
<td></td>
</tr>
<tr>
<td>n = 297</td>
<td></td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>60 (20)</td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>119 (40)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Subsequently, there was no significant difference observed between the two study groups sedentary staged participants who moved into the active stages between baseline and 8-months (Yates Corrected $X^2 (1, n = 258) = 3.07, p = 0.08; OR = 1.60, 95% CI = 0.95-2.70).  

Q.4.1 A comparison between the intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by the sedentary Stages of Change

This Section examines the difference between those participants who were in the active stages (P, A & M) at baseline compared to those participants who were in the sedentary stages (PC & C) at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months. There was no significant difference between the number of sedentary staged participants at baseline and active staged participants at baseline who report at least a 1-hour increase in total physical activity between baseline and 2-months reported at least a 1-hour increase in total physical activity between baseline and 2-months in the intervention group (McNemar's $X^2 (1, n = 345) = 2.87, p = 0.09$), but there was in the control group (McNemar's $X^2 (1, n = 342) = 11.27, p = 0.01$; see Table Q.10).
Table Q.14: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>190 (55)</td>
<td>59 (17)</td>
<td>131 (38)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>155 (45)</td>
<td>75 (22)</td>
<td>80 (23)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>189 (55)</td>
<td>60 (18)</td>
<td>129 (38)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>153 (45)</td>
<td>49 (14)</td>
<td>104 (30)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Further analysis between the intervention and control groups sedentary staged participants at baseline revealed the sedentary staged intervention groups participants were 1.99 times more likely to increase their total activity status by at least 1-hour at 8-months than the control groups sedentary staged participants (95% CI = 1.22-3.25; see Table Q.15).

Table Q.15: A comparison between the number of sedentary intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>155 (45)</td>
<td>75 (22)</td>
<td>80 (23)</td>
<td>7.90 (0.01)</td>
</tr>
<tr>
<td>control group</td>
<td>153 (45)</td>
<td>49 (14)</td>
<td>104 (30)</td>
<td>(&lt;0.01)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward logistic regression was again conducted using only the data from the sedentary baseline participants from each group (Model Fit; $X^2$ = 22.64, $p = 0.000$ (-2 log likelihood = 381.17). The model retained group allocation, and baseline activity status. The significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the sedentary staged participants at baseline were; i. being in the intervention group (OR = 1.93, 95% CI = 1.19-3.16), ii. baseline activity level <15-minutes (OR = 2.77, 95% CI = 1.58-5.00)
Appendix Q

compared to baseline activity ≥60-minutes per week. Other variables retained the model were not independently significant (see Table Q.16).

Table Q.16: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously sedentary baseline sample categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>0.66</td>
<td>0.25</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (intervention)</td>
<td>0.66</td>
<td>0.25</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (&lt;15min/wk)</td>
<td>0.66</td>
<td>0.25</td>
<td>0.01</td>
<td>1.93 (1.19-3.16)</td>
</tr>
<tr>
<td>baseline activity (≥15 to 60 min/wk)</td>
<td>-0.26</td>
<td>0.32</td>
<td>0.41</td>
<td>0.77 (0.41-1.44)</td>
</tr>
<tr>
<td>baseline activity (≥60 min/wk)</td>
<td>-1.03</td>
<td>0.29</td>
<td>0.00</td>
<td>0.36 (0.20-0.63)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.5); language (p = 0.4); age (p = 0.5); employment status (p = 0.6); child at home (p = 0.7); BMI (p = 0.9); marital Status (p = 0.6); baseline intention (p = 0.2).

Q.5 Additional Stages of Change data

The following tables relate to the basic movement through the Stages of Change between baseline and 2/-6-months and between 2- and 6- months in the intervention (see Table Q.17) and control (see Table Q.18) groups. These data are commented on in the Illawarra results Chapter 6, Section 6.9.
### Table Q.17: Movement through the Stages of change between baseline and 2-/8-months and between 2- and 8-months within the intervention group

<table>
<thead>
<tr>
<th>Baseline</th>
<th>PC</th>
<th>C</th>
<th>P</th>
<th>A</th>
<th>M</th>
<th>R</th>
<th>total</th>
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</tr>
<tr>
<td>C</td>
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<td>23</td>
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<td>7</td>
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<td>78</td>
</tr>
<tr>
<td>P</td>
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<td>14</td>
<td>3</td>
<td>17</td>
<td>2</td>
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<td>-</td>
<td>2</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>13</td>
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<td>total</td>
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<td>78</td>
<td>77</td>
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<td>64</td>
<td>9</td>
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<table>
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<tr>
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<th>P</th>
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<th>R</th>
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<td>-</td>
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<table>
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<th>C</th>
<th>P</th>
<th>A</th>
<th>M</th>
<th>R</th>
<th>total</th>
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<td>13</td>
</tr>
<tr>
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<td>80</td>
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</table>

PC = Pre-contemplation, C = Contemplation, P = Preparation, A = Action & M = Maintenance

### Table Q.18: Movement through the Stages of change between baseline and 2-/8-months and between 2- and 8-months within the control group

<table>
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<tr>
<th>Baseline</th>
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<th>M</th>
<th>R</th>
<th>total</th>
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<table>
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<th>M</th>
<th>R</th>
<th>total</th>
</tr>
</thead>
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<td>11</td>
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<td>11</td>
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<td>6</td>
<td>28</td>
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<td>68</td>
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<td>4</td>
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<tr>
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<td>67</td>
<td>80</td>
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<td>79</td>
<td>6</td>
<td>315</td>
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</table>

<table>
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<th>2-mth</th>
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<th>C</th>
<th>P</th>
<th>A</th>
<th>M</th>
<th>R</th>
<th>total</th>
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<td>1</td>
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<td>1</td>
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<tr>
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<td>67</td>
<td>80</td>
<td>26</td>
<td>79</td>
<td>6</td>
<td>315</td>
</tr>
</tbody>
</table>

PC = Pre-contemplation, C = Contemplation, P = Preparation, A = Action & M = Maintenance
Appendix R

NSW RCT
Treatment Received results
The results presented in this Appendix are based on those participants who reported actually receiving the self-help print intervention. The participants, therefore, from the intervention group who reported receiving the self-help print intervention were broadly referred to as the Treatment Received (TR) intervention group. Data from 185 and 142 intervention group participants are included in the 2- and 8-month data analysis respectively (see Table R.1).

Table R.1: Number of participants in the original intervention and control groups’ and the new TR intervention group

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-month</th>
<th>8-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>361</td>
<td>334</td>
<td>307</td>
</tr>
<tr>
<td>TR intervention group</td>
<td>253</td>
<td>233</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>358</td>
<td>335</td>
<td>315</td>
</tr>
</tbody>
</table>

To determine if potential biases exist from excluding those participants who did not report receiving the self-help print intervention the demographic data from the TR intervention group were compared with the control group (see Table R.2).

Table R.2: Comparison between the TR intervention and control groups’ mean baseline demographics and physical activity levels

<table>
<thead>
<tr>
<th></th>
<th>September 1997</th>
<th>September 1997</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 335</td>
<td>n = 253</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender (male)</td>
<td>35.5</td>
<td>32.4</td>
<td>1.77*</td>
<td>0.18</td>
</tr>
<tr>
<td>age (yrs)</td>
<td>42.9 ± 9.3</td>
<td>42.5 ± 8.9</td>
<td>0.47</td>
<td>0.64</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.69 ± 0.13</td>
<td>1.68 ± 0.10</td>
<td>0.87</td>
<td>0.38</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>71.4 ± 15.5</td>
<td>71.5 ± 16.1</td>
<td>-0.90</td>
<td>0.93</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.1 ± 5.3</td>
<td>25.2 ± 4.9</td>
<td>-0.38</td>
<td>0.71</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking (hrs/wk)</td>
<td>1.45 ± 2.10</td>
<td>1.51 ± 2.12</td>
<td>0.35</td>
<td>0.73</td>
</tr>
<tr>
<td>moderate (hrs/wk)</td>
<td>0.31 ± 0.74</td>
<td>0.27 ± 0.85</td>
<td>2.05</td>
<td>0.41</td>
</tr>
<tr>
<td>vigorous (hrs/wk)</td>
<td>0.28 ± 0.90</td>
<td>0.49 ± 1.52</td>
<td>-0.44</td>
<td>0.66</td>
</tr>
<tr>
<td>total (hrs/wk)</td>
<td>2.04 ± 2.52</td>
<td>2.28 ± 2.72</td>
<td>1.11</td>
<td>0.27</td>
</tr>
</tbody>
</table>

* Yates Corrected Chi Square
R.1 Background media recall and impact in the TR intervention group

The control group participants recalled more health messages all three data collection points (see Figure R.1). However, there was no statistically significant difference between the TR intervention and control groups baseline ($X^2(1, n = 611) = 1.266, p = 0.26$), 2-months ($X^2(1, n = 588) = 0.62, p = 0.43$), or 8-months ($X^2(1, n = 548) = 0.11, p = 0.75$) media recall data.

![Figure R.1: Frequency of recalling any health messages in the TR intervention and control groups at baseline, 2 and 8-months](image)

There were no significant differences between the number of TR intervention and control group participants who recalled specific physical activity related messages (see shaded section of Table R.3) at; baseline (40% versus 42%; $p = 0.980$), 2-months (19% versus 15%; $p = 0.30$), or 8-months (17% versus 19%; $p = 0.70$). Both study groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation (see Table R.3).
Table R.3: Unprompted message recall by the TR intervention and control groups at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2 months (n)</th>
<th>8 months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>intervention*</td>
<td>41</td>
<td>27</td>
<td>23</td>
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<tr>
<td></td>
<td>control#</td>
<td>51</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'no ifs...no buts'</td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
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<td>-</td>
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<td>'Active Over 50's'</td>
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<td>-</td>
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<tr>
<td>Specific Campaign</td>
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<td>9</td>
<td>1</td>
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<tr>
<td>'Exercise: take it regularly not seriously'</td>
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<td>-</td>
<td>6</td>
<td>-</td>
</tr>
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<td>Exercise and Heart</td>
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<td>3</td>
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<tr>
<td>Exercise and Diet</td>
<td>intervention</td>
<td>4</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
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<td>9</td>
</tr>
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<td>Exercise Machines</td>
<td>intervention</td>
<td>36</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>61</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>General Health</td>
<td>intervention</td>
<td>2</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Diet</td>
<td>intervention</td>
<td>2</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>intervention</td>
<td>4</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>intervention</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>intervention</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Community Events #</td>
<td>intervention</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Smoking</td>
<td>intervention</td>
<td>-</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Can't Recall</td>
<td>intervention</td>
<td>24</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>42</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

* intervention group n = 253.

# control group n = 358.
Appendix R

R.2 Changes in reported physical activity between baseline, 2 and 8-months

Results reported in this section are based on the self-report physical activity prevalence estimates and are similar to the results presented in Section 10.6.

Consistent with the results presented in Section 10.6 there was no significant effects for walking, moderate intensity or total physical activity, but there was a significant effect over time for the vigorous intensity physical activity prevalence (see Table R.4). Both the TR intervention and control groups demonstrated statistically significant increases in vigorous intensity physical activity between baseline and 8-months ($F(1, n = 548) = 4.04, p = 0.02$; baseline to 8-months $t = -2.27, p = 0.02$).

However, there was no significant group $\times$ time interaction for the pooled data.

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>8-months</th>
<th>$F_{group}$</th>
<th>$F_{time}$</th>
<th>$F_{group \times time}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>TR intervention</td>
<td>1.45</td>
<td>1.42</td>
<td>1.47</td>
<td>0.77</td>
<td>0.63</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.51</td>
<td>1.49</td>
<td>1.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.10)</td>
<td>(1.90)</td>
<td>(1.55)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.12)</td>
<td>(1.96)</td>
<td>(2.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>TR intervention</td>
<td>0.31</td>
<td>0.26</td>
<td>0.28</td>
<td>0.00</td>
<td>0.02</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.27</td>
<td>0.31</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.90)</td>
<td>(1.01)</td>
<td>(1.16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.85)</td>
<td>(1.33)</td>
<td>(1.04)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vigorous</td>
<td>TR intervention</td>
<td>0.28</td>
<td>0.38</td>
<td>0.50</td>
<td>2.06</td>
<td>4.04*</td>
<td>1.58</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.49</td>
<td>0.39</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.74)</td>
<td>(0.95)</td>
<td>(1.08)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.52)</td>
<td>(0.89)</td>
<td>(1.34)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>TR intervention</td>
<td>2.03</td>
<td>2.07</td>
<td>2.65</td>
<td>1.50</td>
<td>1.95</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.27</td>
<td>2.19</td>
<td>2.46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.52)</td>
<td>(2.56)</td>
<td>(2.33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.72)</td>
<td>(2.56)</td>
<td>(2.76)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$* p = 0.02$

| Table R.4: Mean (± SD) reported physical activity time (hours per week) reported by the TR intervention (n = 253) and control (n = 358) groups at baseline, 2 and 8-months |

R.3 Proportions meeting a criterion of sufficient physical activity per week at baseline, 2 and 8-months

Over two thirds of the TR intervention and control group (67% and 65% respectively) participants were classified as participating in less than 150-minutes of physical activity a week at baseline (see Table R.5). Hence, there was no significant
difference between the study groups at baseline (Yates Corrected $X^2 (1, n = 611) = 0.36, p = 0.55$).

There were no statistically significant changes within either study group in relation to the proportion of participants reaching the 150-minute per week criterion by 2-months (TR intervention; McNemars $X^2 (1, n = 253) = 0.01, p = 0.91$; see Section 10.7 for control group results). Hence, there was also no significant difference between groups at 2-months (Yates Corrected $X^2 (1, n = 611) = 0.11, p = 0.75$).

Table R.5: The number TR intervention group participating in at least 150-minutes of physical activity per week at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-month n (%)</th>
<th>8-month (n) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td>≥ 150-minutes</td>
<td>≥ 150-minutes</td>
</tr>
<tr>
<td>TR intervention group</td>
<td>n = 253</td>
<td>40 (16)</td>
<td>43 (17)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>41 (16)</td>
<td>129 (51)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 253</td>
<td>39 (15)</td>
<td>44 (17)</td>
</tr>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>48 (19)</td>
<td>122 (48)</td>
</tr>
</tbody>
</table>

Similar results were reported at the 8-month follow-up with no statistically significant difference observed within either study group in terms of increased proportions meeting the 150-minute per week criterion (TR intervention group; McNemars $X^2 (1, n = 253) = 0.10, p = 0.76$). Consistently, there was also no significant difference between the two study groups at 8-months (Yates Corrected $X^2 (1, n = 611) = 0.18, p = 0.67$).

R.4 Proportions expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

Results reported in this Section compare the proportion of the TR intervention and control groups who expended adequate amounts of energy from physical activity at baseline, 2- and 8-months (see Section, 10.8). At baseline the TR intervention and control groups reported similar proportions of participants in each energy expenditure category (see Table R.6). Particularly in terms of adequate and inadequate energy expenditure categories (see Section 5.10.3.1), where the TR intervention group reported fewer participants in the adequate category (23%) compared to the control group (28%), although the difference was not significant (Yates Corrected $X^2 (1, n = 611) = 1.15, p = 0.28$).
Similar results were reported at the 2-month follow-up where the TR intervention and control groups reported 28% and 29% of participants respectively were expending adequate amounts of energy from physical activity (see Table R.6). Further examination of the 2-month data showed that a non-significant number of TR intervention group participants who were classified as inadequately active at baseline became adequately active by 2-months ($\chi^2 (1, n = 253) = 1.23, p = 0.27$; see Table R.7). The difference between groups was not significant at 2-months ($\chi^2 (1, n = 611) = 0.15, p = 0.70$).

Table R.6: Changes in energy expenditure categories in the TR intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>TR intervention group n = 253 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
</tr>
<tr>
<td>High</td>
<td>13 (5)</td>
</tr>
<tr>
<td>Moderate</td>
<td>45 (18)</td>
</tr>
<tr>
<td>Low</td>
<td>137 (54)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>59 (23)</td>
</tr>
</tbody>
</table>

By the 8-month follow-up the control group reported 38% of the participants were expending adequate amounts of energy from physical activity, whereas the TR intervention group reported only 32% (see Table R.6). Despite the 6.3% difference between groups expending adequate amounts of energy from physical activity but this difference was not significant ($\chi^2 (1, n = 611) = 1.86, p = 0.17$). Further examination of the 8-month energy expenditure change data showed a significant change in the number of participants moving from inadequate to adequate activity categories in the TR intervention group ($\chi^2 (1, n = 253) = 4.98, p = 0.03$; see Table R.7).

Table R.7: Changes in adequate and inadequate energy expenditure categories in the TR intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>baseline energy expenditure</th>
<th>adequate 2-month energy expenditure n (%)</th>
<th>inadequate 8-month energy expenditure n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>46 (18)</td>
<td>149 (59)</td>
</tr>
<tr>
<td>adequate</td>
<td>23 (9)</td>
<td>35 (14)</td>
</tr>
</tbody>
</table>

| inadequate                  | 60 (24)                                   | 135 (53)                                   |
| adequate                    | 21 (8)                                    | 37 (15)                                    |
Therefore, those intervention group participants who recalled receiving the self-help print intervention who were inadequately activity at baseline were more likely to increase their physical activity than those who were adequately active at baseline.

### R.5 Movement through the Stages of Change

The Stage of Change data analysis was again limited to those participants followed up at 8-months who reported receiving the ‘Active Living’ written materials in the mail. As with the intention to treat analysis stage allocation at baseline between the TR intervention and control group were very similar. The TR intervention group had 71% of participants in the early stages (PC, C & P) compared to 68% in the control group (see Table R.8).

**Table R.8: Stage distribution within the TR intervention group at baseline and 8-months**

<table>
<thead>
<tr>
<th>Stage</th>
<th>TR intervention group n = 233 n (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>8-months</td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>39 (17)</td>
<td>38 (16)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>61 (26)</td>
<td>52 (22)</td>
</tr>
<tr>
<td>Preparation</td>
<td>66 (28)</td>
<td>65 (28)</td>
</tr>
<tr>
<td>Action</td>
<td>24 (10)</td>
<td>22 (9)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>31 (13)</td>
<td>51 (16)</td>
</tr>
<tr>
<td>Relapse</td>
<td>12 (2)</td>
<td>5 (2)</td>
</tr>
</tbody>
</table>

There was a 3% increase in M between baseline and 8-months in the TR intervention group, and a 4% decrease in C also reported. These results are similar to those reported in the ITT analysis (see Section 10.10).

#### R.5.1 Progression through the Stages of Change between baseline 2 and 8-months

There were no significant differences between the number of TR intervention group participants progressing at least one stage between baseline and 2-months compared to the control group ($X^2 (1, n = 588) = 0.16, p = 0.69$; OR = 1.09, 95%CI = 0.77-1.53; see Table R.9).
Table R.9: A comparison between the TR intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n =253*</td>
<td>107 (42)</td>
<td>146 (57)</td>
</tr>
<tr>
<td>control group n =335*</td>
<td>135 (40)</td>
<td>200 (60)</td>
</tr>
</tbody>
</table>

As with the 2-month data analysis there were no significant differences between the number of TR intervention group participants progressing at least one stage between baseline and 8-months compared to the control group ($\chi^2 (1, n = 548) = 0.05, p = 0.82; \text{OR} = 0.95, 95\%\text{CI} = 0.66-1.35; \text{see Table R.10})$.

Table R.10: A comparison between the TR intervention and control group participants who progressed at least one stage between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n =233*</td>
<td>110 (47)</td>
<td>123 (53)</td>
</tr>
<tr>
<td>control group n =315*</td>
<td>153 (49)</td>
<td>162 (51)</td>
</tr>
</tbody>
</table>

R.5.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months

By combining the inactive early stages (PC, C & P) compared to the later active stages (A & M) enables the progression from inadequate activity to adequate activity levels from baseline to 2-months to be analysed.

Of the 179 participants in the TR intervention group who were in PC, C & P combined at baseline 41 moved into the A & M group at 2-months, however, this was not statistically significant (McNemars $\chi^2 (1, n = 236) = 0.48, p = 0.49$) compared to the 34 out of 57 participants moving from A & M to PC, C & P (see Table R.11). Results from the control group were presented in the ITT analysis (Section 7.3.8.2) and were also not significant.

Of the 162 participants in the TR intervention group who were in PC, C & P combined at baseline 50 moved into the A & M group at 8-months. This was not statistically significant (McNemars $\chi^2 (1, n = 216) = 2.31, p = 0.13$) compared to the 35 out of 54 participants moving from A & M to PC, C & P (see Table R.11).
## Table R.11: Movement from inactive to active stages of change within the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>TR intervention group*</th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
<th>8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 236</td>
<td></td>
<td>A &amp; M 17%</td>
<td>PC, C or P 59%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23 (10%)</td>
<td>34 (14%)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2- and 8-months with participants in Relapse removed

## R.5.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months

Of the 111 participants in the TR intervention group who were in PC & C at baseline 49 had moved into the P, A & M group by 2-months. This was not statistically significant result (McNemars $X^2 (1, n = 236) = 0.01, p = 0.92$) compared to the 47 out of 125 participants moving from P, A & M to PC & C (see Table R.12).

## Table R.12: Movement from sedentary to active stages of change within the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>TR intervention group*</th>
<th>2-months n (%)</th>
<th>8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 236</td>
<td>P, A &amp; M 21%</td>
<td>PC &amp; C 26%</td>
</tr>
<tr>
<td></td>
<td>49 (21%)</td>
<td>62 (26%)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 8-months with participants in Relapse removed

Of the 97 participants in the TR intervention group who were in PC & C at baseline, 57 moved into the P, A & M group by 8-months. This was not statistically significant (McNemars $X^2 (1, n = 216) = 1.18, p = 0.28$) compared to the 45 out of 119 participants moving from P, A & M to PC & C (see Table R.12).
Appendix R

R.6 Changes in reported physical activity at 2-months adjusted to baseline level

This analysis classified participants as either inadequately active or adequately active, based on energy expenditure category and subsequent changes in category at 2-months.

R.6.1 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

There was no significant difference between the inadequately active TR intervention group participants at baseline and the adequately active participants at baseline who increased their total physical activity level by at least 1-hour at 2-months (McNemars $X^2 (1, n = 253) = 2.27, p = 0.13$; see Table R.13).

Table R.13: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>58 (23)</td>
<td>10 (4)</td>
<td>48 (19)</td>
</tr>
<tr>
<td>inadequate</td>
<td>195 (77)</td>
<td>65 (26)</td>
<td>130 (51)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.

There was also no significant difference between the TR intervention and control groups’ inadequately active baseline sample who increased their total physical activity status by at least 1-hour between baseline and 2-months (OR = 0.97, 95% CI = 0.61-1.53; see Table R.14).

Table R.14: A comparison between the number of inadequately active TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X$^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>195 (77)</td>
<td>65 (26)</td>
<td>130 (51)</td>
<td>0.01</td>
</tr>
<tr>
<td>control group</td>
<td>261 (73)</td>
<td>97 (27)</td>
<td>164 (46)</td>
<td>0.98</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.
Logistic regression* was conducted using the TR intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 2-months (Model Fit; $X^2 = 14.29, p < 0.01$ (-2 log likelihood = 560.6). The model retained marital status, education level and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline was i. baseline activity status <20-minutes per week (OR = 2.00, 95% CI = 1.22-3.23) compared to baseline activity >80-minutes per week. The other variables retained in the model (marital status and education level and a baseline activity level >20 to 80-minutes per week) were not independently significant predictors of change (see Table R.15).

Table R.15: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>$p$-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>education (&lt;10 years)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>education (≥10 years)</td>
<td>-0.35</td>
<td>0.21</td>
<td>0.09</td>
<td>0.70 (0.47-1.06)</td>
</tr>
<tr>
<td>marital status (couple)</td>
<td>-0.44</td>
<td>0.23</td>
<td>0.06</td>
<td>0.64 (0.41-1.01)</td>
</tr>
<tr>
<td>marital status (single)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td>-0.45</td>
<td>0.24</td>
<td>0.07</td>
<td>0.64 (0.40-1.02)</td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td>-0.69</td>
<td>0.25</td>
<td>0.01</td>
<td>0.50 (0.31-0.82)</td>
</tr>
<tr>
<td>baseline activity (≥80 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention ($p = 0.2$); gender ($p = 0.9$); language ($p = 0.7$); age ($p = 1.0$); BMI ($p = 0.5$); child at home ($p = 0.4$); employment status ($p = 0.6$); group allocation ($p = 0.4$).

The same variables used in the logistic regression in Chapter 9 were again entered in the models in this Appendix.
R.6.2  A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

As before this analysis will classify participants as either inadequately active or adequately active, based on their baseline Stage of Change and subsequent changes at 2-months.

There was a significant difference between adequately active and inadequately active TR intervention group participants who increased their total physical activity level by more than 1-hour at 2-months (McNemars $X^2$ (1, n = 253) = 93.34, $p < 0.001$; see Table R.16).

**Table R.16:** Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>58 (24)</td>
<td>10 (4)</td>
<td>48 (20)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>181 (76)</td>
<td>59 (25)</td>
<td>122 (51)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was no significant difference between the TR intervention and control groups terms of the number of inactive staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.86, 95% CI = 0.56-1.32; see Table R.17).

**Table R.17:** A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour (%)</th>
<th>other* (%)</th>
<th>X$^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>181 (76)</td>
<td>59 (25)</td>
<td>122 (51)</td>
<td>0.37 (0.52)</td>
</tr>
<tr>
<td>control group</td>
<td>245 (72)</td>
<td>88 (26)</td>
<td>157 (46)</td>
<td>(0.52)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Logistic regression was conducted using the TR intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 2-months (Model Fit; $X^2 = 8.01, p = 0.005$ (-2 log likelihood = 531.2). The model retained baseline activity status but not aspects of the variable were significant predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline was baseline activity status <20-minutes per week (OR = 2.08, 95% CI = 1.25-3.45) compared to baseline activity >80-minutes per week. The other variable (baseline activity level >20 to 80-minutes per week) was not an independently significant predictor of change (see Table R.18).

**Table R.18:** Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td>-0.43</td>
<td>0.25</td>
<td>0.08</td>
<td>0.65 (0.40-1.07)</td>
</tr>
<tr>
<td>baseline activity (≥80 min/wk)</td>
<td>-0.73</td>
<td>0.26</td>
<td>0.01</td>
<td>0.48 (0.29-0.80)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender ($p = 0.7$); language ($p = 0.4$); age ($p = 0.7$); BMI ($p = 0.9$); child at home ($p = 0.7$); employment status ($p = 0.5$); group allocation ($p = 0.3$); marital status ($p = 0.2$); education level ($p = 0.1$); language ($p = 0.8$); baseline intention ($p = 0.2$).

**R.6.3** A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

There was a significant difference between the sedentary staged TR intervention group participants at baseline and the active staged participants at baseline who increased their total physical activity level by at least 1-hour at 2-months (McNemars $X^2 (1, n = 253) = 15.89, p < 0.001$; see Table R.19).
Table R.19: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>127 (53)</td>
<td>34 (14)</td>
<td>93 (39)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>112 (47)</td>
<td>35 (15)</td>
<td>77 (32)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

However, there was no significant difference reported between the TR intervention or control groups in terms of the number of sedentary staged participants at baseline who increased their total physical activity by at least 1-hour (OR = 0.91, 95% CI = 0.52-1.58; see Table R.20).

Table R.20: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention</td>
<td>112 (47)</td>
<td>35 (15)</td>
<td>77 (32)</td>
<td>0.51</td>
</tr>
<tr>
<td>control group</td>
<td>153 (45)</td>
<td>51 (15)</td>
<td>102 (30)</td>
<td>0.82</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Logistic regression* was conducted using the TR intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 2-months (Model Fit; \(X^2 = 11.44, p < 0.01\) (-2 log likelihood = 316.5). The model retained education level and baseline activity status but not all aspects of the variables were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline were; i. having <10-years education (OR = 1.92, 95% CI = 1.11-3.23), ii.
baseline activity status <15-minutes per week (OR = 2.33, 95% CI = 1.08-5.00) compared to baseline activity ≥15 to 60-minutes per week. The other variable retained in the model (baseline activity level between ≥60-minutes per week) was not an independently significant predictor of change (see Table R.21).

**Table R.21:** Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>education (&lt;10 years)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>education (£10 years)</td>
<td>-0.64</td>
<td>0.27</td>
<td>0.02</td>
<td>0.53 (0.31-0.90)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 min/wk)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥15 to 60 min/wk)</td>
<td>-0.84</td>
<td>0.39</td>
<td>0.03</td>
<td>0.43 (0.20-0.93)</td>
</tr>
<tr>
<td>baseline activity (≥60 min/wk)</td>
<td>-0.38</td>
<td>0.30</td>
<td>0.21</td>
<td>0.68 (0.38-1.23)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention (p = 0.2); gender (p = 0.3); marital status (p = 0.8); language (p = 0.9); age (p = 0.8); BMI (p = 0.9); child at home (p = 0.9); employment status (p = 0.4); group allocation (p = 0.5).

**R.7 Changes in reported physical activity at 8-months adjusted to baseline level**

**R.7.1 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by energy expenditure**

There was a significant difference between the inadequately and adequately active participants at baseline who increased their total physical activity by at least 1-hour between the baseline and 8-months (McNemars $X^2 (1, n = 253) = 10.71, p < 0.001; see Table R.22). This finding warranted further investigation into the differences between the TR intervention and control groups.

**Table R.22:** Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>58 (23)</td>
<td>7 (3)</td>
<td>51 (20)</td>
</tr>
<tr>
<td>inadequate</td>
<td>195 (77)</td>
<td>91 (36)</td>
<td>104 (41)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.
There was a significant difference between the TR intervention and control groups in terms of the number of inadequately active baseline participants who increased their total physical activity by at least 1-hour between baseline and 8-months. Whereby, the TR intervention group inadequately active participant at baseline were 1.48 times more likely to increase their total physical activity by at least 1-hour between baseline and 8-months than the inadequately active control group participants at baseline (95% CI = 1.00-2.20; see Table R.23).

Table R.23: A comparison between the number of inadequately active TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n(%)</th>
<th>X^2 (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>195 (77)</td>
<td>91 (36)</td>
<td>104 (41)</td>
<td>3.78</td>
</tr>
<tr>
<td>control group</td>
<td>261 (73)</td>
<td>97 (27)</td>
<td>164 (46)</td>
<td>(0.05)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Logistic regression was conducted using the TR intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 8-months (Model Fit; $X^2 = 44.64, p < 0.01$ (-2 log likelihood = 556.6)). The model retained group allocation, language spoken at home, baseline intention, and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inadequately active participants at baseline were; i. being in the TR intervention group (OR = 1.49, 95% CI = 1.00-2.19), ii. baseline activity status <20-minutes per week (OR = 1.79, 95% CI = 1.10-2.86) compared to ≥20 to80-minutes per week and (OR = 4.17, 95% CI = 2.50-7.14) compared to ≥80-minutes per week, iii. baseline intention to be more active within the next month (OR = 1.83, 95% CI = 1.13-3.00), and iv. speaking English at home (OR = 5.21, 95% CI = 1.13-24.02). The other variable retained in the model (intention to be more active in the next 6-months) was not an independently significant predictor of change (see Table R.24).
Table R.24: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>( p )-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.39</td>
<td>0.20</td>
<td>0.05</td>
<td>1.49 (1.00-2.19)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>1.65</td>
<td>0.78</td>
<td>0.03</td>
<td>5.12 (1.13-24.02)</td>
</tr>
<tr>
<td>language (English)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td>0.61</td>
<td>0.25</td>
<td>0.02</td>
<td>1.83 (1.13-3.00)</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>0.16</td>
<td>0.26</td>
<td>0.52</td>
<td>1.18 (0.70-1.95)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td>-0.57</td>
<td>0.54</td>
<td>0.02</td>
<td>0.56 (0.35-0.91)</td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥80 min/wk)</td>
<td>-1.43</td>
<td>0.26</td>
<td>0.00</td>
<td>0.24 (0.14-0.40)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender \( p = 0.4 \); language \( p = 0.9 \); age \( p = 0.6 \); employment status \( p = 0.7 \); child at home \( p = 0.2 \); BMI \( p = 0.4 \).

R.7.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

There was a significant difference between the inactive and active staged TR intervention group participants at baseline who increased their total physical activity by at least 1-hour between the baseline and 8-months (McNemars \( \chi^2 \) (1, \( n = 221 \)) = 73.23, \( p < 0.001 \); see Table R.25). This finding warranted further investigation into the differences between the TR intervention and control groups.

Table R.25: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>55 (25)</td>
<td>7 (3)</td>
<td>51 (21)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>166 (75)</td>
<td>87 (36)</td>
<td>94 (39)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was a significant difference between the TR intervention and control groups inadequately active sample who increased their physical activity by at least 1-hour.
between baseline and 8-months (see Table R.26). The TR intervention group inactive staged participants were 1.54 times more likely to increase their physical activity by 1-hour than the control group between baseline and 8-months (95% CI = 1.02-2.32).

Table R.26: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other * n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention</td>
<td>166 (75)</td>
<td>87 (36)</td>
<td>94 (39)</td>
<td>4.30</td>
</tr>
<tr>
<td>control group</td>
<td>245 (72)</td>
<td>92 (27)</td>
<td>153 (23)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Logistic regression was conducted using the TR intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 8-months (Model Fit; $X^2 = 45.66$, $p < 0.001$ (-2 log likelihood = 524.4)). The model retained group allocation, language spoken at home, baseline intention and baseline activity level but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. being in the TR intervention group (OR = 1.58, 95% CI = 1.05-2.39), ii. speaking English at home (OR = 5.13, 95% CI = 1.12-23.78), iii. having a baseline activity level <20-minutes per week (OR = 1.67, 95% CI = 1.02-2.70, compared to ≥20 to 80-minutes per week) and (OR = 4.00, 95% CI = 2.38-6.67, compared to ≥80-minutes per week), and iv. having a baseline intention to be more active within the next month (OR = 1.90, 95% CI = 1.12-3.22). The other variable retained in the model (intention to be more active in the next 6-months) was not an independently significant predictor of change (see Table R.27).
Table R.27: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>0.46</td>
<td>0.21</td>
<td>0.03</td>
<td>1.58 (1.05-2.39)</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>1.64</td>
<td>0.78</td>
<td>0.04</td>
<td>5.13 (1.12-23.78)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>0.64</td>
<td>0.27</td>
<td>0.02</td>
<td>1.90 (1.12-3.22)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td>0.20</td>
<td>0.27</td>
<td>0.46</td>
<td>1.22 (0.72-2.07)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td>-0.51</td>
<td>0.25</td>
<td>0.04</td>
<td>0.60 (0.37-0.98)</td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td>-1.40</td>
<td>0.27</td>
<td>0.00</td>
<td>0.25 (0.15-0.42)</td>
</tr>
<tr>
<td>baseline activity (≥80 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.6); education (p = 0.7); age (p = 0.7); employment status (p = 0.9); child at home (p = 0.5); BMI (p = 0.7); marital status (p = 0.3)

R.7.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

There was a significant difference between the sedentary staged TR intervention group participants at baseline and the active staged participants at baseline who increased their total physical activity level by at least 1-hour at 8-months (McNemars $X^2 (1, n = 221) = 2.89, p = 0.09$; see Table R.28).

Table R.28: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary verse active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>121 (55)</td>
<td>41 (17)</td>
<td>86 (36)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>100 (45)</td>
<td>53 (22)</td>
<td>59 (25)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

However, there was a significant difference between the TR intervention and control groups in terms of the number of sedentary staged baseline participants who increased their total physical activity by at least 1-hour between baseline
and 8-months. Whereby, the TR intervention group sedentary staged participants at baseline were 1.91 times more likely to increase their total physical activity by at least 1-hour between baseline and 8-months than the sedentary staged control group participants at baseline (95% CI = 1.12-3.25; see Appendix R, Table R.29).

Table R.29: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>100 (45)</td>
<td>53 (22)</td>
<td>59 (25)</td>
<td>5.76</td>
</tr>
<tr>
<td>control group</td>
<td>153 (45)</td>
<td>49 (14)</td>
<td>104 (30)</td>
<td>(0.02)</td>
</tr>
</tbody>
</table>

*other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Logistic regression was conducted using the TR intervention group data to determine any significant predictors of adopting an extra hour of physical activity at 8-months (Model Fit; $X^2 = 19.25, p < 0.001$ (-2 log likelihood = 329.1). The model retained group allocation and baseline activity status but not all aspects of the variables were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the sedentary staged participants at baseline were; i. being in the TR intervention group (OR = 1.98, 95% CI = 1.16-3.35), and ii. having a baseline activity status <15-minutes per week (OR = 2.44, 95% CI = 1.52-3.85, compared to ≥15-minutes per week). The other variable retained in the model (baseline activity level ≥15 to 60-minutes per week) was not an independently significant predictor of change (see Table R.30).
Table R.30: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.68</td>
<td>0.27</td>
<td>0.01</td>
<td>1.97 (1.16-3.35)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>baseline activity (≥15 to 60 min/wk)</td>
<td>-0.51</td>
<td>0.35</td>
<td>0.15</td>
<td>0.60 (0.30-1.19)</td>
</tr>
<tr>
<td>baseline activity (≥60 min/wk)</td>
<td>-1.02</td>
<td>0.31</td>
<td>0.00</td>
<td>0.36 (0.20-0.66)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention (p = 0.3); marital Status (p = 0.4); language (p = 0.2); age (p = 0.5); employment status (p = 0.8); child at home (p = 0.9); BMI (p = 0.8); gender (p = 0.9).

R.8 Maintenance of behaviour change between 2 and 8-months between the TR intervention and control groups

The results presented in this Section are focused on those participants in the TR intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and then maintained that increase at 8-months. Out of the 253 intervention and 358 control group participants followed-up at 8-months, 40 intervention and 56 control participants who had maintained the initial 1-hour increase they reported at 2-months at the 8-month follow-up, however, the difference in proportions was not significant between groups (Yates Corrected $X^2 = 0.00, p = 1.00$).
Appendix S

NSW RCT
Treatment Received
& Read
results
The results presented in this Appendix are based on those participants who reported actually receiving the self-help print intervention and reading it (see Section 8.10 and Section 9.5) The participants, therefore, from the intervention group who reported receiving the self-help print intervention were broadly referred to as the Treatment Received and Read (TR&R) intervention group. Data from 185 and 142 intervention group participants are included in the 2 and 6 month data analysis respectively (see Table S.1).

Table S.1: Number of participants in the original intervention and control groups' and the new TR&R intervention group

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-month</th>
<th>8-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>361</td>
<td>334</td>
<td>307</td>
</tr>
<tr>
<td>TR&amp;R intervention group</td>
<td>358</td>
<td>335</td>
<td>315</td>
</tr>
<tr>
<td>control group</td>
<td>358</td>
<td>334</td>
<td>315</td>
</tr>
</tbody>
</table>

It is acknowledged that TR&R analysis may introduce a potential bias in that participants’ who report receiving the self-help print intervention may differ systematically from those who do not. To determine if potential biases exist demographic data from the TR&R intervention group were compared with the control group (see Table S.2).

Table S.2: Comparison between the TR&R intervention and control groups’ mean baseline demographics and physical activity levels

<table>
<thead>
<tr>
<th></th>
<th>Sept 1997 n = 335 control group</th>
<th>Sept 1997 n = 210 TR&amp;R intervention group</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender (male)</td>
<td>35.5</td>
<td>31.4</td>
<td>2.21*</td>
<td>0.12</td>
</tr>
<tr>
<td>age (yrs)</td>
<td>43.1 ± 8.9</td>
<td>42.3 ± 9.3</td>
<td>-0.27</td>
<td>0.79</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.69 ± 0.12</td>
<td>0.92</td>
<td>0.36</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>72.3 ± 16.5</td>
<td>71.6 ± 15.5</td>
<td>-0.69</td>
<td>0.49</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.5 ± 5.0</td>
<td>25.1 ± 4.9</td>
<td>-1.07</td>
<td>0.29</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking (hrs/wk)</td>
<td>1.35 ± 1.82</td>
<td>1.51 ± 2.12</td>
<td>0.91</td>
<td>0.37</td>
</tr>
<tr>
<td>moderate (hrs/wk)</td>
<td>0.35 ± 0.96</td>
<td>0.27 ± 0.85</td>
<td>1.87</td>
<td>0.06</td>
</tr>
<tr>
<td>vigorous (hrs/wk)</td>
<td>0.28 ± 0.74</td>
<td>0.49 ± 1.52</td>
<td>-0.96</td>
<td>0.34</td>
</tr>
<tr>
<td>total (hrs/wk)</td>
<td>1.98 ± 2.38</td>
<td>2.28 ± 2.72</td>
<td>1.30</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Yates Corrected Chi Square

Descriptive t-tests failed to find a statistically significant difference between the two study groups in terms of baseline physical demographics and physical activity.
prevalence (see Table S.2). Therefore, the TR&R intervention group and the control groups were comparable in terms of baseline demographics, therefore comparisons between the two groups in terms of reported changes in physical activity may be conducted.

**S.1 Background media recall and impact in the TR&R intervention group**

The control group again reported higher message recall at all three data collection points there was no statistically significant difference between the groups baseline \( \chi^2 (1, n = 568) = 1.32, p = 0.25 \), 2 months \( \chi^2 (1, n = 545) = 2.31, p = 0.13 \), or 8-months \( \chi^2 (1, n = 509) = 0.03, p = 0.86 \); see Figure S.1).

![Figure S.1: Frequency of recalling any health messages in the TR&R intervention and control groups at baseline, 2 and 8-months](image)

There were no significant differences between the number of TR intervention and control group participants who recalled specific physical activity related messages (see shaded section of Table S.3) at; baseline (38% versus 42%; \( p = 0.50 \)), 2-months (21% versus 15%; \( p = 0.12 \)), or 8-months (18% versus 19%; \( p = 0.77 \)). Both study groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation (see Table S.3).
Table S.3: Unprompted message recall by the TR&R intervention and control groups at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2 months (n)</th>
<th>8 months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>intervention*</td>
<td>34</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>control*</td>
<td>51</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'no ifs...no buts'</td>
<td>intervention</td>
<td>14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>29</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'Active Over 50’s'</td>
<td>intervention</td>
<td>-</td>
<td>9</td>
<td>-1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>'Exercise: take it regularly not seriously'</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Exercise and Heart</td>
<td>intervention</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>5</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Exercise and Diet</td>
<td>intervention</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>intervention</td>
<td>37</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>61</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>General Health</td>
<td>intervention</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Diet</td>
<td>intervention</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>intervention</td>
<td>4</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>intervention</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>intervention</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Community Events #</td>
<td>intervention</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Smoking</td>
<td>intervention</td>
<td>-</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Can’t Recall</td>
<td>intervention</td>
<td>22</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>42</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

* intervention group n = 210  
# control group n = 358.
S.2 Changes in reported physical activity between baseline, 2 and 8-months

Results reported in this section are based on the self-report physical activity prevalence estimates and are similar to the results presented in Section 10.6.

Consistent with the results presented in Section 9.6 there was no significant effects for walking, moderate intensity or total physical activity, but there was a significant effect over time for the vigorous intensity physical activity prevalence (see Table S.4). Both the TR&R intervention and control groups demonstrated statistically significant increases in vigorous intensity physical activity between baseline and 8-months \((F = 3.53, p = 0.03; \text{ between baseline and 8-months } t = -2.01, p = 0.04)\). However, there was no significant group \(\times\) time interaction for the pooled data.

Table S.4: Mean physical activity times (hours per week) reported by the TR&R intervention (n = 210) and control (n = 358) groups at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>8-months</th>
<th>(F) group (F) time</th>
<th>(F) group (\times) time</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>TR&amp;R intervention</td>
<td>1.35 (1.82)</td>
<td>1.36 (1.67)</td>
<td>1.44 (1.53)</td>
<td>1.90</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.51 (2.12)</td>
<td>1.49 (1.96)</td>
<td>1.65 (2.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>TR&amp;R intervention</td>
<td>0.35 (0.96)</td>
<td>0.22 (0.94)</td>
<td>0.49 (1.11)</td>
<td>0.01</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.27 (0.85)</td>
<td>0.31 (1.33)</td>
<td>0.28 (1.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vigorous</td>
<td>TR&amp;R intervention</td>
<td>0.28 (0.74)</td>
<td>0.36 (0.90)</td>
<td>0.30 (1.25)</td>
<td>2.29</td>
<td>3.53*</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.49 (1.52)</td>
<td>0.39 (0.89)</td>
<td>0.56 (1.34)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>TR&amp;R intervention</td>
<td>1.98 (2.38)</td>
<td>1.93 (2.05)</td>
<td>2.23 (2.23)</td>
<td>2.61</td>
<td>2.61</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.27 (2.72)</td>
<td>2.19 (2.56)</td>
<td>2.46 (2.76)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( p = 0.03 \)

S.3 Proportion of the TR&R intervention group meeting a criterion of sufficient physical activity per week at baseline, 2 and 8-months

Over two thirds of the TR&R intervention and control group (68\% and 65\% respectively) participants were classified as participating in less than 150-minutes of physical activity per week at baseline (see Table S.5). Hence, there was no
significant difference between the study groups at baseline (Yates corrected $X^2 (1, n = 568) = 0.43, p = 0.51$).

**Table S.5:** The number TR&R intervention group participating in at least 150-minutes of physical activity per week at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>$\geq$ 150-minutes</th>
<th>$&lt; 150$-minutes</th>
<th>2-month n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group n = 210</td>
<td>$\geq$ 150-minutes</td>
<td>33 (16)</td>
<td>35 (17)</td>
<td>32 (15)</td>
</tr>
<tr>
<td></td>
<td>$&lt; 150$-minutes</td>
<td>33 (16)</td>
<td>35 (17)</td>
<td>39 (19)</td>
</tr>
</tbody>
</table>

There were no statistically significant changes within either study group in relation to the proportion of participants reaching the 150-minute per week criterion by 2-months (TR&R intervention; McNemars $X^2 (1, n = 210) = 0.06, p = 0.81$; see Section 9.7 for control group results). Hence, there was also no significant difference between the two study groups (Yates corrected $X^2 (1, n = 568) = 0.01, p = 0.98$).

Similar results were reported at the 8-month follow-up with no statistically significant differences observed within either groups (TR&R intervention group; McNemars $X^2 (1, n = 210) = 0.12, p = 0.73$). However, slightly fewer control group participants were meeting the criterion at 8-months (see Table S.5), but the difference between group was not significant (Yates corrected $X^2 (1, n = 568) = 0.14, p = 0.71$).

**S.4 Proportions expending adequate amounts of energy from physical activity at baseline, 2 and 8-months**

Results reported in this Section compare the proportion of the TR&R intervention and control groups who expended adequate amounts of energy from physical activity at baseline, 2 and 8-months (see Section 10.8).

At baseline the TR&R intervention and control groups reported similar proportions of participants in each energy expenditure category (see Table S.6). Particularly in terms of adequate and inadequate energy expenditure categories (see Section 5.10.3.1), where the TR&R intervention group reported fewer participants in the
adequate category (23%) compared to the control group (27%), although the difference was not significant (Yates Corrected $\chi^2 (1, n = 568) = 1.04, p = 0.31$).

**Table S.6:** Changes in energy expenditure categories in the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>TR&amp;R intervention group n = 210 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
</tr>
<tr>
<td>High</td>
<td>12 (6)</td>
</tr>
<tr>
<td>Moderate</td>
<td>36 (17)</td>
</tr>
<tr>
<td>Low</td>
<td>115 (55)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>47 (22)</td>
</tr>
</tbody>
</table>

Similar results were reported at the 2-month follow-up where the TR&R intervention and control groups reported 25.7% and 29.1% of participants respectively were expending adequate amounts of energy from physical activity (Yates Corrected $\chi^2 (1, n = 568) = 0.58, p = 0.45$; see Table S.6). Further examination of the 2-month data (see Table S.7) showed that a non-significant number of TR&R intervention group participants who were classified as inadequately active at baseline became adequately active by 2-months (McNemars $\chi^2 (n = 210) = 0.38, p = 0.54$).

**Table S.7:** Changes in adequate and inadequate energy expenditure categories in the TR&R intervention group between baseline, 2- and 8-months

<table>
<thead>
<tr>
<th>baseline energy expenditure</th>
<th>adequate</th>
<th>inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>36 (17)</td>
<td>126 (60)</td>
</tr>
<tr>
<td>adequate</td>
<td>18 (9)</td>
<td>30 (14)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8 month energy expenditure</th>
<th>inadequate</th>
<th>adequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>49 (23)</td>
<td>113 (54)</td>
</tr>
<tr>
<td>adequate</td>
<td>17 (8)</td>
<td>31 (15)</td>
</tr>
</tbody>
</table>

By the 8-month follow-up the control group reported 38% of the participants were expending adequate amounts of energy from physical activity, whereas the TR&R intervention group reported only 32% (see Table S.7). Despite the 7% difference between groups expending adequate amounts of energy from physical activity but this difference was not significant (Yates Corrected $\chi^2 (1, n = 568) = 1.70, p = 0.19$; see Table S.7). Further examination of the 8-month energy expenditure change data showed a significant difference between the number of intervention group
participants moving from inadequate to adequate activity categories between baseline and 8-months ($\chi^2 (1, n = 210) = 4.00, p = 0.05$; see Table S.7).

S.5 Movement through the Stages of Change

The Stages of Change data analysis was again limited to those participants followed up at 8-months who reported receiving the ‘Active Living’ written materials in the mail. As with the intention to treat analysis stage allocation at baseline between the TR&R intervention and control group were very similar. The TR&R intervention group had 72% of participants in the early stages (PC, C & P) compared to 68% in the control group (see Table S.8).

<table>
<thead>
<tr>
<th>Stage</th>
<th>TR&amp;R intervention group n = 194 (%)</th>
<th>baseline</th>
<th>8-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>32 (17)</td>
<td></td>
<td>31 (16)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>50 (26)</td>
<td></td>
<td>48 (25)</td>
</tr>
<tr>
<td>Preparation</td>
<td>58 (30)</td>
<td></td>
<td>51 (26)</td>
</tr>
<tr>
<td>Action</td>
<td>19 (10)</td>
<td></td>
<td>19 (10)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>26 (13)</td>
<td></td>
<td>42 (22)</td>
</tr>
<tr>
<td>Relapse</td>
<td>9 (5)</td>
<td></td>
<td>3 (2)</td>
</tr>
</tbody>
</table>

There was a 9% increase in M between baseline and 8-months in the TR&R intervention group, and a 4% decrease in C also reported. These results are similar to those reported in the ITT analysis (see Section 10.10).

S.5.1 Progression through the Stages of Change between baseline, 2 and 8- months by the TR&R intervention group

There were no significant differences between the number of TR&R intervention group participants progressing at least one stage compared to the control group ($\chi^2 (1, n = 545) = 0.00, p = 1.00$; OR = 1.01, 95%CI = 0.70-1.45; see Table S.9).

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group n = 210</td>
<td>81 (40.5)</td>
<td>125 (59.5)</td>
</tr>
<tr>
<td>control group n = 335</td>
<td>135 (40)</td>
<td>200 (60)</td>
</tr>
</tbody>
</table>
Appendix S

As with the 2-month data analysis there were no significant differences between the number of TR&R intervention group participants progressing at least one stage compared to the control group ($X^2 (1, n = 509) = 0.08, p = 0.78; OR = 0.94, 95\%CI = 0.64-1.36; \text{see Table S.10}$).

Table S.10: A comparison between the TR&R intervention and control group participants who progressed at least one stage between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group n = 194</td>
<td>91 (47)</td>
<td>103 (53)</td>
</tr>
<tr>
<td>control group n = 315</td>
<td>153 (49)</td>
<td>162 (59)</td>
</tr>
</tbody>
</table>

S.5.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months by the TR&R intervention group

By combining the inactive early stages (PC, C & P) compared to the later active stages (A & M) enables the progression from inadequate activity to adequate activity levels from baseline to 2-months to be analysed.

Of the 149 participants in the TR&R intervention group who were in PC, C & P combined at baseline 32 moved into the A & M group at 2-months (see Table S.16). This was not statistically significant (McNemars $X^2 (1, n = 196) = 0.07, p = 0.80$) compared to the 29 out of 47 participants moving from A & M to PC, C & P (see Table S.11). Results from the control group were presented in the ITT analysis (Section 7.3.8.2) and were also not significant.

Table S.11: Movement from inactive to active Stages of Change within the TR&R intervention group between baseline, 2 and 6-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at 2-months n (%)</th>
<th>Stage at 8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage at baseline (n)</td>
<td>A &amp; M</td>
</tr>
<tr>
<td>TR&amp;R intervention group</td>
<td>n = 196*</td>
<td>32 (16)</td>
</tr>
<tr>
<td></td>
<td>PC, C &amp; P</td>
<td>18 (9)</td>
</tr>
<tr>
<td></td>
<td>A &amp; M</td>
<td></td>
</tr>
<tr>
<td>TR&amp;R intervention group</td>
<td>n = 182*</td>
<td>42 (21)</td>
</tr>
<tr>
<td></td>
<td>PC, C &amp; P</td>
<td>15 (8)</td>
</tr>
<tr>
<td></td>
<td>A &amp; M</td>
<td></td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2- and 8-months with participants in Relapse removed
Of the 138 participants in the TR&R intervention group who were in PC, C & P combined at baseline, 42 moved into the A & M group at 8-months. This was not statistically significant (McNemars $X^2 (1, n = 182) = 2.03, p = 0.15$) compared to the 29 out of 54 participants moving from A & M to PC, C & P (see Table S.11).

**S.5.3 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months by the TR&R intervention group**

Of the 90 participants in the TR&R intervention group who were in PC & C at baseline, 37 had moved into the P, A & M group by 2-months. This was not statistically significant result (McNemars $X^2 (1, n = 196) = 0.12, p = 0.73$) compared to the 41 out of 106 participants moving from P, A & M to PC & C (see Table S.12).

<table>
<thead>
<tr>
<th>TR&amp;R intervention group*</th>
<th>baseline</th>
<th>2-months n (%)</th>
<th>8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n = 196</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>37 (19)</td>
<td>53 (27)</td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>65 (33)</td>
<td>41 (21)</td>
<td></td>
</tr>
<tr>
<td><strong>n = 182</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>46 (25)</td>
<td>34 (19)</td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>61 (34)</td>
<td>41 (23)</td>
<td></td>
</tr>
</tbody>
</table>

Table S.12: Movement from sedentary to active Stages of Change within the TR&R intervention group between baseline, 2 and 8-months.

Of the 80 participants in the TR&R intervention group who were in PC & C at baseline, 46 moved into the P, A & M group by 8-months. This was not statistically significant (McNemars $X^2 (1, n = 182) = 0.18, p = 0.67$) compared to the 41 out of 102 participants moving from P, A & M to PC & C (see Table S.12).

**S.6 Changes in reported physical activity at 2-months adjusted to baseline level**

This analysis classified participants as either inadequately active or adequately active, based on EEC and subsequent changes in category at 2-months.
S.6.1 A comparison between the TR&R intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

There was no significant difference between the inadequately active TR&R intervention group participants at baseline and the adequately active participants at baseline who increased their total physical activity level by at least 1-hour at 2-months (McNemars $X^2 (1, n = 210) = 1.08, p = 0.30$; see Table S.13).

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>48 (23)</td>
<td>7 (3)</td>
<td>41 (20)</td>
</tr>
<tr>
<td>inadequate</td>
<td>162 (77)</td>
<td>52 (25)</td>
<td>110 (52)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.

There was no significant difference between the TR&R intervention and control groups in terms of the number of inadequately active baseline participants who increased their total physical activity status by at least 1-hour between baseline and 2-months (OR = 0.87, 95% CI = 0.56-1.34; see Table S.14).

<table>
<thead>
<tr>
<th>Group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>$X^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention</td>
<td>162 (77)</td>
<td>52 (25)</td>
<td>110 (52)</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>261 (73)</td>
<td>97 (27)</td>
<td>164 (46)</td>
<td>(0.58)</td>
<td></td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Logistic regression* was conducted using the TR&R intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 2-months (Model Fit; $X^2 = 18.99, p < 0.01$ (-2 log likelihood = 511.3)). The model retained marital status, education level, baseline intention and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline were; i. having a baseline activity status <20-minutes per week (OR = 1.72, 95% CI = 1.04-2.86, compared to baseline activity ≥20 to 80-minutes per week), and (OR = 2.22, 95% CI = 1.32-3.85, compared to baseline activity ≥80-minutes per week) and ii. reporting an intention to be more active within the next month at baseline (OR = 1.80, 95% CI = 1.06-3.06). The other variables retained in the model (marital status, education level, baseline intention to be more active in the next 6-months) were not independently significant predictors of change (see Table S.15).

### Table S.15: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>$p$-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.59</td>
<td>0.27</td>
<td>0.03</td>
<td>1.80 (1.06-3.06)</td>
</tr>
<tr>
<td>intention (next 6 months)</td>
<td>0.26</td>
<td>0.28</td>
<td>0.35</td>
<td>1.29 (0.75-2.25)</td>
</tr>
<tr>
<td>education(&lt;10 years)</td>
<td>-0.38</td>
<td>0.22</td>
<td>0.09</td>
<td>0.68 (0.44-1.04)</td>
</tr>
<tr>
<td>education (≥10 years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>marital status (single)</td>
<td>-0.44</td>
<td>0.24</td>
<td>0.07</td>
<td>0.64 (0.97-2.49)</td>
</tr>
<tr>
<td>marital status (couple)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td>-0.55</td>
<td>0.26</td>
<td>0.03</td>
<td>0.57 (0.54-0.96)</td>
</tr>
<tr>
<td>baseline activity (≥ 80 min/wk)</td>
<td>-0.80</td>
<td>0.27</td>
<td>0.00</td>
<td>0.45 (0.26-0.76)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender ($p = 0.7$); language ($p = 0.6$); age ($p = 1.0$); BMI ($p = 0.4$); child at home ($p = 0.4$); employment status ($p = 0.6$); group allocation ($p = 0.3$).

* The same variables were used Chapter 9 were again entered in the logistic regression analysis presented in this Appendix.
S.6.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

As before this analysis will classify participants as either inadequately active or adequately active, based on their baseline Stage of Change and subsequent changes at 2-months.

There was a significant difference between adequately active and inadequately active participants who increased their total physical activity level by more than 1-hour at 2-months (McNemars $X^2 (1, n = 199) = 82.05, p < 0.001$; see Table S.16). This finding warranted further investigation into the differences between the TR&R intervention and control groups.

Table S.16: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorized by inactive versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>48 (24)</td>
<td>48 (24)</td>
<td>103 (52)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>151 (76)</td>
<td>7 (4)</td>
<td>41 (21)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was no significant difference between the TR&R intervention and control groups in terms of the inadequately active participants at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.83, 95% CI = 0.53-1.31; see Table S.17).

Table S.17: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>$X^2 (p)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>151 (76)</td>
<td>7 (4)</td>
<td>41 (21)</td>
<td>0.06</td>
</tr>
<tr>
<td>control group</td>
<td>245 (72)</td>
<td>88 (26)</td>
<td>157 (46)</td>
<td>0.79</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Logistic regression was conducted using the TR&R intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 2-months (Model Fit; $X^2 = 13.45$, $p < 0.01$ (-2 log likelihood = 486.3). The model retained baseline intention and baseline activity status but not aspects of the variables were significant predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline were; i. reporting an intention to be more active within the next month at baseline (OR = 1.83, 95% CI = 1.04-3.25) and ii. reporting a baseline activity status <20-minutes per week (OR = 2.32, 95% CI = 1.37-4.17, compared to baseline activity $\geq$80-minutes per week). The other variables (baseline intention to be more active in the next 6-months and baseline activity level $\geq$20 to 80-minutes per week) were not independently significant predictors of change (see Table S.18).

Table S.18: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention (none)</td>
<td>1.0</td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.61</td>
<td>0.29</td>
<td>0.03</td>
<td>1.83 (1.04-3.25)</td>
</tr>
<tr>
<td>intention (next 6-months)</td>
<td>0.31</td>
<td>0.29</td>
<td>0.28</td>
<td>1.37 (0.77-2.41)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td>-0.50</td>
<td>0.26</td>
<td>0.05</td>
<td>0.61 (0.36-1.01)</td>
</tr>
<tr>
<td>baseline activity (≥80 min/wk)</td>
<td>-0.86</td>
<td>0.28</td>
<td>0.00</td>
<td>0.43 (0.24-0.73)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender ($p = 0.6$); language ($p = 0.7$); age ($p = 0.7$); BMI ($p = 0.7$); child at home ($p = 0.8$); employment status ($p = 0.6$); education ($p = 0.1$); group allocation ($p = 0.2$); marital status ($p = 0.2$).

S.6.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary Stage of Change

There was a significant number of sedentary staged TR&R intervention group participants increase their total physical activity by at least 1-hour between baseline and 2-months compared to the active staged participants at baseline (McNemars $X^2 (1, n = 196) = 13.02$, $p < 0.001$; see Table S.19). This finding
warranted further investigation into the differences between the TR&R intervention and control groups.

**Table S.19:** Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>108 (54.3)</td>
<td>29 (15)</td>
<td>79 (40)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>91 (45.7)</td>
<td>26 (13)</td>
<td>65 (33)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Consistent with the previous stage change results, there was no significant difference reported between the number of sedentary staged TR&R intervention or control group participants at baseline who increased their total physical activity by at least 1-hour (OR = 0.80, 95%CI = 0.44-1.46; see Table S.20).

**Table S.20:** A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other n (%)</th>
<th>χ² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>91 (45.7)</td>
<td>26 (13)</td>
<td>65 (33)</td>
<td>0.40</td>
</tr>
<tr>
<td>control group</td>
<td>153 (45)</td>
<td>51 (15)</td>
<td>102 (30)</td>
<td>0.53</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Logistic regression* was conducted using the TR&R intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 2-months (Model Fit; $\chi^2 = 14.43, p = 0.002$ (-2 log likelihood = 283.7). The model retained Gender, education level and baseline activity status but not all aspects of the variables were individually significantly

* The same variables were used Chapter 9 were again entered in the logistic regression analysis presented in this Appendix, expect for baseline activity level where the trichotomous distribution was slightly altered to suit the sedentary stage category (<15-minutes per week, ≥15 to 60-minutes per week and ≥60-minutes per week).
Appendix S

The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline were; i. having <10-years education (OR = 1.92, 95% CI = 1.10-3.45), and ii. reporting a baseline activity status <15-minutes per week (OR = 2.86, 95% CI = 1.25-6.67, compared to baseline activity ≥15 to 60-minutes per week). The other variables retained in the model, gender and baseline activity level between ≥60-minutes per week, were not independent significant predictors of change (see Table S.21).

Table S.21: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-Value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>education (&lt; 10-years)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>education (≥ 10-years)</td>
<td>-0.66</td>
<td>0.29</td>
<td>0.02</td>
<td>0.51 (0.29-0.91)</td>
</tr>
<tr>
<td>gender (female)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>gender (male)</td>
<td>-0.57</td>
<td>0.32</td>
<td>0.08</td>
<td>0.56 (0.30-1.06)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 60 min/wk)</td>
<td>-1.06</td>
<td>0.43</td>
<td>0.02</td>
<td>0.34 (0.15-0.80)</td>
</tr>
<tr>
<td>baseline activity (≥60 min/wk)</td>
<td>-0.61</td>
<td>0.33</td>
<td>0.06</td>
<td>0.54 (0.28-1.04)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention (p = 0.2); marital status (p = 0.5); language (p = 0.7); age (p = 0.5); BMI (p = 0.9); child at home (p = 1.0); employment status (p = 0.5); group allocation (p = 0.2).

S.7 Changes in reported physical activity at 8-months adjusted to baseline level

S.7.1 A comparison between the TR&R intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by energy expenditure

There was a significant difference between the inadequately active TR&R intervention group participants at baseline and the adequately active participants at baseline who increased their total physical activity level by at least 1-hour at 2-months (McNemars $X^2 (1, n = 210) = 6.40, p = 0.01$; see Table S.22).
Table S.22: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>48 (23)</td>
<td>5 (2)</td>
<td>43 (21)</td>
</tr>
<tr>
<td>inadequate</td>
<td>162 (77)</td>
<td>71 (34)</td>
<td>91 (43)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was no significant difference between the TR&R intervention and control groups in terms of the number of inadequately active baseline participants increasing their total activity prevalence by at least 1-hour between baseline and 8-months (OR = 1.32, 95% CI = 0.87-2.01; see Table S.23).

Table S.23: A comparison between the number of inadequately active TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention</td>
<td>162 (77)</td>
<td>71 (34)</td>
<td>91 (43)</td>
<td>1.59</td>
</tr>
<tr>
<td>control group</td>
<td>261 (73)</td>
<td>97 (27)</td>
<td>164 (46)</td>
<td>0.21</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Logistic regression was conducted using the TR&R intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 8-months (Model Fit; $X^2 = 42.76; p < 0.001$ (-2 log likelihood = 513.0)). The model retained language spoken at home, baseline intention, and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inadequately active participants at baseline were; i. having a baseline activity level <20-minutes per week (OR = 1.89, 95% CI = 1.15-3.03, compared to ≥20 to 80-minutes per week) and (OR = 4.35, 95% CI = 2.44-7.14, compared to ≥80 minutes per week), ii. reporting an intention to be more active within the next month at baseline (OR = 2.04, 95% CI
= 1.20-3.45), and iii. speaking English at home (OR = 4.81, 95% CI = 1.64-22.17). The other variable retained in the model (intention to be more active in the next 6-months) was not an independently significant predictor of change (see Table S.24).

**Table S.24:** Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inadequately active baseline sample categorised by energy expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.71</td>
<td>0.27</td>
<td>0.01</td>
<td>2.04 (1.20-3.45)</td>
</tr>
<tr>
<td>intention (next 6 months)</td>
<td>0.254</td>
<td>0.27</td>
<td>0.36</td>
<td>1.28 (0.76-2.18)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>language (English)</td>
<td>1.57</td>
<td>0.78</td>
<td>0.04</td>
<td>4.80 (1.64-22.17)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥20 to 80 min/wk)</td>
<td>-0.63</td>
<td>0.25</td>
<td>0.01</td>
<td>0.53 (0.33-0.87)</td>
</tr>
<tr>
<td>baseline activity (≥ 80 min/wk)</td>
<td>-1.45</td>
<td>0.28</td>
<td>0.00</td>
<td>0.23 (0.23-0.41)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 1.0); age (p = 0.5); employment status (p = 0.9); child at home (p = 0.3); BMI (p = 0.5); group allocation (p = 0.2), marital status (p = 0.9); education (p = 0.6).

**S.7.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change**

There was a significant difference between the inactive staged TR&R intervention group participants at baseline and the active staged participants at baseline who increased their total physical activity level by at least 1-hour at 2-months (McNemars $X^2 (1, n = 199) = 67.83, p = 0.01$; see Table S.25).
Table S.25: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>48 (24)</td>
<td>68 (34)</td>
<td>83 (42)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>151 (76)</td>
<td>5 (3)</td>
<td>43 (22)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was no significant difference between the TR&R intervention and control groups inactive staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 1.36, 95% CI = 0.88-2.10; see Table S.26).

Table S.26: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>151 (76)</td>
<td>5 (3)</td>
<td>43 (22)</td>
<td>1.87</td>
</tr>
<tr>
<td>control group</td>
<td>245 (72)</td>
<td>92 (27)</td>
<td>153 (23)</td>
<td>(0.17)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Logistic regression was conducted using the TR&R intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 8-months (Model Fit; $X^2 = 40.54$, $p < 0.001$ (-2 log likelihood = 484.2)). The model retained language spoken at home, baseline intention and baseline activity level but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. speaking English at home (OR = 4.67, 95% CI = 1.01-21.52), ii. reporting a baseline activity level <20-minutes per week (OR = 1.72, 95% CI = 1.04-2.86, compared to ≥20 to 80-minutes per week and (OR = 4.35, 95% CI = 2.44-7.69, compared to ≥80-minutes per week), and iii. reporting an intention to
be more active within the next month at baseline (OR = 2.220, 95% CI = 1.26-3.93). The other variable retained in the model (intention to be more active in the next 6-months) was not an independently significant predictor of change (see Table S.27).

Table S.27: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive baseline sample categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.80</td>
<td>0.29</td>
<td>0.01</td>
<td>2.22 (1.26-3.93)</td>
</tr>
<tr>
<td>intention (next 6-months)</td>
<td>0.32</td>
<td>0.29</td>
<td>0.26</td>
<td>1.38 (0.78-2.43)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>language (English)</td>
<td>1.54</td>
<td>0.78</td>
<td>0.05</td>
<td>4.67 (1.01-21.52)</td>
</tr>
<tr>
<td>baseline activity (&lt;20 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (£20 to 80 min/wk)</td>
<td>-0.55</td>
<td>0.26</td>
<td>0.03</td>
<td>0.58 (0.35-0.96)</td>
</tr>
<tr>
<td>baseline activity (£ 80 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥ 80 min/wk)</td>
<td>-1.46</td>
<td>0.29</td>
<td>0.00</td>
<td>0.23 (0.13-0.41)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 1.0); age (p = 0.4); employment status (p = 1.0); child at home (p = 0.4); BMI (p = 0.5); group allocation (p = 0.2); education (p = 0.6); marital status (p = 0.4).

S.7.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

There was a significant number of sedentary staged TR&R intervention group participants increase their total physical activity by at least 1-hour between baseline and 8-months compared to the active staged participants at baseline (McNemars $X^2 (1, n = 199) = 3.36, p = 0.07$; see Table S.28). Nonetheless, this finding warranted further investigation into the differences between the TR&R intervention and control groups.
Table S.28: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>108 (54)</td>
<td>34 (17)</td>
<td>74 (37)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>91 (46)</td>
<td>39 (20)</td>
<td>52 (26)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Consistent with the results reported above, there was no significant difference reported between the TR&R intervention or control group in terms of the number of sedentary staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 1.47, 95%CI = 0.82-2.62; see Table S.29).

Table S.29: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>91 (46)</td>
<td>39 (20)</td>
<td>52 (26)</td>
<td>2.45</td>
</tr>
<tr>
<td>control group</td>
<td>153 (45)</td>
<td>49 (14)</td>
<td>104 (30)</td>
<td>(0.12)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Logistic regression was conducted using the TR&R intervention group data to confirm the results and determine any significant predictors of adopting an extra hour of physical activity at 8-months (Model Fit; $X^2 = 15.22, p < 0.001$ (-2 log likelihood = 299.1)). The model retained group allocation and baseline activity status but not all aspects of the variables were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the sedentary staged participants at baseline was a baseline activity status <15-minutes per week (OR =2.86, 95% CI = 1.52-5.26) compared to ≥60-minutes per week. The other variables retained in the
model, baseline activity level ≥15 to 60-minutes per week and group allocation, were not independently significant predictors of change (see Table S.30).

Table S.30: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>(TR&amp;R intervention)</td>
<td>0.52</td>
<td>0.28</td>
<td>0.07</td>
<td>1.68 (0.97-2.91)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 60 min/wk)</td>
<td>-0.72</td>
<td>0.38</td>
<td>0.05</td>
<td>0.49 (0.23-1.03)</td>
</tr>
<tr>
<td>baseline activity (≥ 60 min/wk)</td>
<td>-1.05</td>
<td>0.32</td>
<td>0.00</td>
<td>0.35 (0.19-0.66)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: intention (p = 0.2); marital status (p = 0.5); language (p = 0.2); age (p = 0.2); employment status (p = 0.7); child at home (p = 0.8); BMI (p = 0.5); gender (p = 0.5); education (p = 0.2)

S.8 Maintenance of behaviour change between 2 and 8-months between the TR&R intervention and control groups

The results presented in this Section are focused on those participants in the TR&R intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and then maintained that increase at 8-months. Out of the 210 intervention and 358 control group participants followed-up at 8-months, 31 intervention and 56 control participants who had maintained the initial 1-hour increase they reported at 2-months at the 8-month follow-up, however, the difference in proportions was not significant between groups (Yates Corrected $X^2 = 0.03, p = 0.87$).
Appendix T

NSW RCT
over 40’s
sub-sample results
T.1 Characteristics of the study sample

These results relate to the analysis described in Section 6.10 as Over 40’s sub-sample analysis. Therefore, participants who were aged over 40 years of age at baseline only were included in the analysis. This was conducted to have comparable group based analysis to the Illawarra RCT. Therefore, data analysed in this section includes 229 intervention and 225 control group participants at baseline (see Table 1).

Table T.1: Number of participants aged over 40 years of age in the intervention and control groups' at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-months</th>
<th>8-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>229</td>
<td>213</td>
<td>199</td>
</tr>
<tr>
<td>control group</td>
<td>225</td>
<td>215</td>
<td>204</td>
</tr>
</tbody>
</table>

There was no statistically significant difference between the intervention and control group participants' aged over 40 years in terms of their baseline physical demographics or reported physical activity (see Table T.2).

Table T.2: Comparison between the intervention and control groups participants aged over 40 years mean baseline demographics and physical activity levels

<table>
<thead>
<tr>
<th>Demographics</th>
<th>March 1998 n=229 intervention group</th>
<th>March 1998 n=225 control group</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (male)</td>
<td>35.4%</td>
<td>39.1%</td>
<td>0.19*</td>
<td>0.66-</td>
</tr>
<tr>
<td>age (yrs)</td>
<td>48.6 ± 6.0</td>
<td>48.6 ± 6.2</td>
<td>-0.03</td>
<td>0.97</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.69 ± 0.14</td>
<td>0.79</td>
<td>0.43</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>73.6 ± 15.3</td>
<td>73.5 ± 16.1</td>
<td>-0.08</td>
<td>0.94</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.9 ± 4.5</td>
<td>25.7 ± 5.4</td>
<td>-0.33</td>
<td>0.74</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking (hrs/wk)</td>
<td>1.31 ± 2.00</td>
<td>1.54 ± 2.28</td>
<td>1.16</td>
<td>0.25</td>
</tr>
<tr>
<td>moderate (hrs/wk)</td>
<td>0.45 ± 1.46</td>
<td>0.21 ± 0.72</td>
<td>-2.18</td>
<td>0.03</td>
</tr>
<tr>
<td>vigorous (hrs/wk)</td>
<td>0.25 ± 0.70</td>
<td>0.47 ± 1.68</td>
<td>1.77</td>
<td>0.08</td>
</tr>
<tr>
<td>total (hrs/wk)</td>
<td>2.01 ± 2.51</td>
<td>2.22 ± 2.93</td>
<td>0.82</td>
<td>0.41</td>
</tr>
</tbody>
</table>

* Yates Corrected Chi Square
Appendix T

T.2 Background media influences on the study groups

There was no statistically significant difference between the intervention or control groups recall of any health message during the baseline ($X^2 (1, n = 454) = 0.35$, $p=0.55$), 2-month ($X^2 (1, n = 428) = 0.23$, $p = 0.63$), or 8-month ($X^2 (1, n = 403) = 0.70$, $p = 0.40$) follow-up data. The control group, however, recorded larger message recall at baseline and 8-months.

![Image](image_url)

**Figure T.1:** Frequency of recalling any health messages by the intervention and control group participants aged over 40 years at baseline, 2 and 8-months

Furthermore, there were no significant differences between the number of intervention and control group participants aged over 40 who recalled specific physical activity related messages (see shaded Section of Table T.3) at; baseline (41% versus 43%; $p = 0.89$) 2-months (21% versus 16%; $p = 0.31$), or 8-months (17% versus 20%; $p = 0.72$). Both study groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation, these data are presented in Table T.3)
### Table T.3: Unprompted message recall by the intervention and control group participants aged over 40 at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2-months (n)</th>
<th>8-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>intervention</td>
<td>34</td>
<td>27</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>32</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'no ifs...no buts'</td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'Active Over 50's'</td>
<td>control</td>
<td>17</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>'Exercise: take it regularly not seriously'</td>
<td>control</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Exercise and Heart</td>
<td>intervention</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Exercise and Diet</td>
<td>intervention</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>intervention</td>
<td>44</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>41</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>General Health</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Diet</td>
<td>intervention</td>
<td>-</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>intervention</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>intervention</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>intervention</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Community Events</td>
<td>intervention</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Smoking</td>
<td>intervention</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Can't Recall</td>
<td>intervention</td>
<td>24</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>25</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

* intervention group n = 229
# control group n = 225
T.3 Changes in reported physical activity between baseline, 2- and 8-months

Consistent with the results presented in Section 10.6 there was no significant effects for walking, moderate or total physical activity, but there was a significant effect over time for the vigorous physical activity prevalence (see Table T.4). Both the intervention and control groups demonstrated statistically significant increases in vigorous physical activity between baseline and 8-months ($F(1, n = 403) = -3.57, p = 0.03$). This effect was found to be significant between baseline to 2-months ($t = 2.07, p = 0.04$), not baseline and 2-months ($t = -1.78, p = 0.08$). Furthermore, there was no significant group $\times$ time effect observed.

Table T.4: Mean physical activity times (hours per week) reported by the intervention (n = 229) and control (n = 225) group participants aged over 40 years at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>8-months</th>
<th>$F_{\text{group}}$</th>
<th>$F_{\text{time}}$</th>
<th>$F_{\text{group}}$ $\times$ time</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>intervention</td>
<td>1.31</td>
<td>1.68</td>
<td>1.53</td>
<td>0.87</td>
<td>0.16</td>
<td>2.30</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>(1.99)</td>
<td>(2.32)</td>
<td>(1.56)</td>
<td>(2.28)</td>
<td>(1.89)</td>
<td>(2.01)</td>
</tr>
<tr>
<td>moderate</td>
<td>intervention</td>
<td>0.44</td>
<td>0.29</td>
<td>0.34</td>
<td>0.00</td>
<td>0.74</td>
<td>2.45</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>(1.46)</td>
<td>(1.14)</td>
<td>(1.31)</td>
<td>(0.73)</td>
<td>(1.63)</td>
<td>(1.14)</td>
</tr>
<tr>
<td>vigorous</td>
<td>intervention</td>
<td>0.25</td>
<td>0.33</td>
<td>0.45</td>
<td>1.71</td>
<td>3.60*</td>
<td>1.31</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>(0.70)</td>
<td>(0.93)</td>
<td>(1.29)</td>
<td>(1.67)</td>
<td>(0.77)</td>
<td>(1.50)</td>
</tr>
<tr>
<td>total</td>
<td>intervention</td>
<td>2.01</td>
<td>2.30</td>
<td>2.32</td>
<td>0.00</td>
<td>0.92</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>(2.51)</td>
<td>(2.70)</td>
<td>(2.47)</td>
<td>(2.93)</td>
<td>(2.69)</td>
<td>(2.89)</td>
</tr>
</tbody>
</table>

$* p = 0.03$

T.4 Proportion of the intervention and control groups’ aged over 40 years who were meeting a criterion of sufficient physical activity per week at baseline, 2 and 8-months

Over two thirds of the intervention and control group (67% and 66% respectively) participants were classified as participating in less than 150-minutes of physical
activity a week at baseline (see Table T.5). Hence, there was no significant difference between the study groups at baseline (Yates Corrected $X^2$ (1, n= 454) = 0.18, $p = 0.90$).

There were no statistically significant changes within either study group in relation to the proportion of participants reaching the 150 minute criterion by 2-months (intervention; McNemars $X^2$ (1, n= 229) = 0.198, $p = 0.66$. control; McNemars $X^2$ (1, n= 225) = 1.55, $p < 0.21$). Hence, there was also no significant difference between groups (Yates Corrected $X^2$ (1, n= 454) = 0.15, $p = 0.70$).

Table T.5: The number intervention and control group participants aged over 40 years participating in at least 150-minutes of physical activity per week at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>≥ 150-minutes</th>
<th>&lt; 150-minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td>n = 229</td>
<td>32 (14)</td>
<td>43 (19)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>38 (17)</td>
<td>116 (51)</td>
</tr>
<tr>
<td><strong>control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td>n = 225</td>
<td>31 (14)</td>
<td>45 (20)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>33 (15)</td>
<td>116 (52)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>≥ 150-minutes</th>
<th>&lt; 150-minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td>n = 229</td>
<td>30 (13)</td>
<td>45 (20)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>41 (18)</td>
<td>113 (49)</td>
</tr>
<tr>
<td><strong>control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>group</td>
<td>n = 225</td>
<td>38 (17)</td>
<td>38 (17)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>32 (14)</td>
<td>117 (52)</td>
</tr>
</tbody>
</table>

Similar results were reported at the 8-month follow-up with no statistically significant differences observed within either group (intervention group; McNemars $X^2$ (1, n= 225) = 0.10, $p = 0.75$). However, slightly more control group participants were meeting the criterion at 8-months (see Table T.5), but the difference was not significant ($X^2$ (1, n= 229) = 0.36, $p = 0.55$).

**T.5 Proportions of the intervention and control groups’ expending adequate amounts of energy from physical activity at baseline, 2 and 8-months**

At baseline the intervention and control groups reported similar proportions of participants in each energy expenditure category (see Table 6). Particularly in terms of adequate and inadequate energy expenditure categories (see Section 5.10.3.1), where the intervention group reported fewer participants in the adequate category
Appendix T

(25%) compared to the control group (28%), although the difference was not significant (Yates Corrected $\chi^2 (1, n= 454) = 0.29, p = 0.59$). Similar results were reported at the 2-month follow-up where the intervention and control groups reported 28% and 29% of participants respectively were expending adequate amounts of energy from physical activity (Yates Corrected $\chi^2 (1, n= 454) = 0.01, p = 0.93$; see Table T.6).

Table T.6: Changes in energy expenditure categories in the intervention and control group participants aged over 40 years at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>intervention group n = 229 n (%)</th>
<th>control group n = 225 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>2-month</td>
</tr>
<tr>
<td>High</td>
<td>11 (5)</td>
<td>14 (6)</td>
</tr>
<tr>
<td>Moderate</td>
<td>46 (20)</td>
<td>51 (22)</td>
</tr>
<tr>
<td>Low</td>
<td>117 (51)</td>
<td>124 (54)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>55 (24)</td>
<td>40 (18)</td>
</tr>
</tbody>
</table>

Further examination of the 2-month data (see Table T.7) showed that a non-significant number of intervention group participants who were classified as inadequately active at baseline became adequately active by 2-months (McNemars $\chi^2 (1, n= 229) = 0.61, p = 0.43$). Similar results were observed with the control group (McNemars $\chi^2 (1, n= 225) = 0.00, p = 1.00$).

Table T.7: Changes in adequate and inadequate energy expenditure categories in the intervention and control group participants aged over 40 years between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>intervention group n = 229</th>
<th>control group n = 225</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>adequate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 (12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36 (16)</td>
</tr>
</tbody>
</table>

By the 8-month follow-up the control group reported 33% of the participants were expending adequate amounts of energy from physical activity, whereas the intervention group reported only 32% (see Table T.8). Despite the difference
between groups expending adequate amounts of energy from physical activity but this difference was not significant \(X^2(1, n= 454) = 0.02, p = 0.90\).

Further examination of the 8-month energy expenditure change data showed nearly a significant difference in the number of participants moving from inadequate to adequate activity categories in both the intervention and control groups (McNemars \(X^2(1, n= 229) = 2.81, p = 0.09\): McNemars \(X^2(1, n= 225) = 2.15, p = 0.14\) respectively; see Table T.8).

<table>
<thead>
<tr>
<th>Table T.8: Changes in adequate and inadequate energy expenditure categories in the intervention and control group participants aged over 40 years between baseline and 8-months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8-month n (%)</strong></td>
</tr>
<tr>
<td><strong>intervention group</strong></td>
</tr>
<tr>
<td><strong>n = 229</strong></td>
</tr>
<tr>
<td><strong>control group</strong></td>
</tr>
<tr>
<td><strong>n = 225</strong></td>
</tr>
</tbody>
</table>

**T.6 Movement through the Stages of Change**

As with the intention to treat analysis stage allocation at baseline between the intervention and control groups were very similar. The intervention group had 70% of participants in the early stages (PC, C & P) compared to 69% in the control group (see Table T.9.

There was a 8% increase in M between baseline and 8-months in the intervention group, and a 7% decrease in C. Whereas the control group reported a 9% increase in M stage at 8-months, most of which resulted from a decrease in the A stage (5%) (see Table T.9).
### Table T.9: Stage distribution within the intervention and control group participants aged over 40 years at baseline and 8-months

<table>
<thead>
<tr>
<th>Stage</th>
<th>intervention group n = 199</th>
<th>control group n = 204</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td></td>
<td>baseline</td>
<td>8-months</td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>39 (20)</td>
<td>41 (21)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>50 (25)</td>
<td>43 (22)</td>
</tr>
<tr>
<td>Preparation</td>
<td>50 (25)</td>
<td>49 (25)</td>
</tr>
<tr>
<td>Action</td>
<td>18 (9)</td>
<td>18 (9)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>34 (17)</td>
<td>42 (21)</td>
</tr>
<tr>
<td>Relapse</td>
<td>8 (4)</td>
<td>6 (3)</td>
</tr>
</tbody>
</table>

### T.6.1 Progression through the Stages of Change between baseline, 2 and 8-months

Data from all participants followed up at 2-months were used in this analysis (see Table T.10). There were no significant differences between the number of participants progressing at least one stage between groups up to 2-months (Yates Corrected $X^2 (1, n= 428) =0.06, p = 0.94; OR = 1.04, 95%CI = 0.69-1.55$).

### Table T.10: A comparison between the intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 213</td>
<td>86 (20)</td>
<td>127 (30)</td>
</tr>
<tr>
<td>control group n = 215</td>
<td>85 (20)</td>
<td>130 (30)</td>
</tr>
</tbody>
</table>

Data from only the participants followed up at 8-months were analysed. There were no significant differences between the number of participants progressing at least one stage between groups up to 8-months (Yates Corrected $X^2 (1, n= 403) =0.00, p = 1.00; OR = 1.01, 95%CI = 0.67-1.52; see Table T.11).
Table T.11: A comparison between the intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n = 199</td>
<td>90 (22)</td>
<td>109 (27)</td>
</tr>
<tr>
<td>control group n = 204</td>
<td>92 (23)</td>
<td>112 (28)</td>
</tr>
</tbody>
</table>

T.6.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months

Of the 148 participants in the intervention group who were in PC, C & P combined 36 had moved into the A & M group by 2-months, however, this was not statistically significant (McNemars $X^2(1, n= 193) = 0.38, p = 0.54$) compared to the 30 out of 50 participants moving from A & M to PC, C & P (see Table T.12).

Similar results were observed in the control group where of the 139 participants who were in PC, C & P combined at baseline, 33 moved into the A & M group at 2-months. Again this was not statistically significant (McNemars $X^2(1, n= 214) = 0.26, p = 0.61$) compared to the 28 out of 53 participants moving from A & M to PC, C & P (see Table T.12).

Table T.12: Movement from inactive to active Stages of Change within the intervention group between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at 2-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A &amp; M</td>
</tr>
<tr>
<td>intervention group $^*$ n = 193</td>
<td>36 (18)</td>
</tr>
<tr>
<td>control group $^*$ n = 214</td>
<td>20 (10)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Of the 135 participants in the intervention group who were in PC, C & P combined 41 had moved into the A & M group by 8-months, however, this was not statistically significant (McNemars $X^2(1, n= 193) =0.66, p = 0.42$) compared
to the 33 out of 50 participants moving from A & M to PC, C & P (see Table T.13).

Table T.13  Movement from inactive to active Stages of Change within the intervention group between baseline and 8-months

<table>
<thead>
<tr>
<th>Stage at baseline</th>
<th>Stage at 2-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A &amp; M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>intervention group*</th>
<th>n = 193</th>
<th>A &amp; M</th>
<th>41 (22)</th>
<th>94 (51)</th>
</tr>
</thead>
<tbody>
<tr>
<td>control group*</td>
<td>n = 214</td>
<td>A &amp; M</td>
<td>17 (9)</td>
<td>33 (18)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Similar results were observed in the control group where of the 136 participants who were in PC, C & P combined at baseline, 30 moved into the A & M group at 2-months. Again this was not statistically significant (McNemars $X^2 (1, n= 214) = 0.29, p = 0.59$) compared to the 25 out of 55 participants moving from A & M to PC, C & P (see Table T.13).

T.6.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months

Of the 97 participants in the intervention group who were in PC & C combined at baseline 41 moved into either P, A & M by 2-months. This was not statistically significant (McNemars $X^2 (1, n= 198) =0.12, p = 0.73$), compared to the 37 out of 101 participants moving from P, A & M to PC & C (see Table T.14). Similar results were observed in the control group where of the 90 participants in the control group who were in PC & C combined 33 had moved into the P, A & M group at 2-months. This was not a statistically significant result (McNemars $X^2 (1, n= 192) =0.00, p = 1.00$; see Table T.14)
Table T.14: Movement from sedentary to active Stages of Change within the TR&R intervention group between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>intervention group</td>
<td>PC &amp; C</td>
<td>41 (21)</td>
</tr>
<tr>
<td>n = 198*</td>
<td>P, A &amp; M</td>
<td>64 (32)</td>
</tr>
<tr>
<td>control group</td>
<td>PC &amp; C</td>
<td>33 (17)</td>
</tr>
<tr>
<td>n = 192*</td>
<td>P, A &amp; M</td>
<td>70 (37)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

Of the 85 participants in the intervention group participants who were in PC & C at baseline, 48 had moved into either P, A & M by 8-months. This was a statistically significant result ($\chi^2 (1, n= 191) = 0.04, p = 0.84$) compared to the 45 out of 100 participants moving from P, A & M to PC & C (see Table T.15).

Table T.15: Movement from sedentary to active Stages of Change within the intervention group between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>intervention group</td>
<td>PC &amp; C</td>
<td>48 (26)</td>
</tr>
<tr>
<td>n = 191</td>
<td>P, A &amp; M</td>
<td>55 (30)</td>
</tr>
<tr>
<td>control group</td>
<td>PC &amp; C</td>
<td>36 (19)</td>
</tr>
<tr>
<td>n = 194</td>
<td>P, A &amp; M</td>
<td>72 (38)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2-months but with the participants in Relapse removed

This result, however, was not duplicated in the control group where of the 87 participants in PC & C at baseline only 36 moved into the P, A & M group by 2-months. This was not statistically significant ($\chi^2 (1, n= 194) = 0.13, p = 0.72$; see Table T.15).

T.7 Changes in reported physical activity at 2-months adjusted to baseline level

Results presented in this section examine the number of participants in each study group who reported at least a 1 hour increase in their total physical activity between baseline and 2-months. Further examination of the data classified participants as either inadequately active or adequately active, based on energy expenditure or stage...
change between baseline and 2-months and the number of those participants who report the 1-hour increase in total physical activity.

T.7.1 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

A non-significant number of the inadequately active intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the adequately active intervention group participants (McNemars $X^2$ (1 n = 229) = 2.49, $p = 0.11$; see Table T.16). A similar non-significant result was observed in the control group (McNemars $X^2$ (1 n = 225) = 0.08, $p = 0.78$; see Table T.16).

Table T.16: A comparison between intervention and control groups adequately and inadequately active baseline participants aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 2-months

<table>
<thead>
<tr>
<th>groups classified by</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by $\geq$ 1-hour at 2-months n (%)</th>
<th>other$^*$ n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group n=229</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>57 (25)</td>
<td>8 (4)</td>
<td>49 (21)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>172 (75)</td>
<td>67 (29)</td>
<td>105 (6)</td>
</tr>
<tr>
<td><strong>control group n=225</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>62 (28)</td>
<td>9 (4)</td>
<td>53 (24)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>163 (72)</td>
<td>57 (25)</td>
<td>106 (47)</td>
</tr>
</tbody>
</table>

$^*$ reported physical activity increased by <1-hour, remained the same or decreased by any amount

Further analysis between the two study groups inadequately active participants at baseline who reported at least a 1-hour increase in total physical activity between baseline and 2-months was conducted but there was no significant difference observed (OR = 1.19, 95% CI = 0.74-1.90; see Table T.17).
Table T.17: A comparison of the inadequately active baseline intervention and control group participants aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 2-months

<table>
<thead>
<tr>
<th>inadequately active</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months n (%)</th>
<th>other n (%)</th>
<th>$X^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>172 (75)</td>
<td>67 (29)</td>
<td>105 (6)</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>163 (72)</td>
<td>57 (25)</td>
<td>106 (47)</td>
<td>0.58</td>
<td></td>
</tr>
</tbody>
</table>

Nonetheless, backward stepwise logistic regression was conducted on the data to determine any significant predictors of change*. In order to determine any other significant predictors of change backward logistic regression using only the data from the inadequately active baseline sample was conducted. The model retained baseline activity level but not all aspects of the variable were individually significantly predictors (Model Fit; $X^2 = 6.55$, $p = 0.04$ (-2 log likelihood = 421.3)). The only significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline was baseline activity level <15-minutes per week (OR = 2.08, 95% CI = 1.16-3.57) compared to baseline activity ≥70-minutes per week. The other variable retained in the model (baseline activity level ≥15 to 70-minutes per week) was not an independently significant predictor of change (see Table T.18).

* The same variables as were used in previous NSW RCT logistic regression modelling were also entered into the models tested in this Section except that baseline activity status levels changed based on the stage category baseline levels. Dichotomous variables entered in to the model included; group allocation (intervention or control group), gender (male and female), marital status (those married or in a defacto relationship and those single or widowed), language (those who speak English at home and other languages), age (≤50 years and >50 years), children living at home (yes or no), employment status (employed full or part-time, and no employment), education level (<10-years education and ≥10-years education), and variables coded trichotomously were baseline intention (no intention, intend on being more active in the next month, or intend on being more active in the next 6-months), BMI (underweight, normal weight, overweight and obese), baseline activity status (<15-minutes per week, ≥15 to 70-minutes per week and ≥70-minutes per week).
Table T.18: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inadequately active baseline sample classified by energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min/wk)</td>
<td>-0.47</td>
<td>0.28</td>
<td>0.09</td>
<td>0.62 (0.37-1.06)</td>
</tr>
<tr>
<td>baseline activity (≥ 70 min/wk)</td>
<td>-0.72</td>
<td>0.29</td>
<td>0.01</td>
<td>0.49 (0.28-0.86)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: group allocation (p = 0.6); gender (p = 0.5); language (p = 0.5); age (p = 0.9); employment status (p = 0.2); child at home (p = 0.4); BMI (p = 1.0); marital status (p = 0.2); education (p = 0.4); baseline intention (p = 0.1).

T.7.2 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stage of Change

A significant number of the inactive staged intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the active staged intervention group participants (McNemars X² (1 n = 220) = 77.65, p < 0.001; see Table T.16). A similar significant result was observed in the control group (McNemars X² (1 n = 214) = 71.41, p < 0.001; see Table T.19).

Table T.19: Proportion of the intervention and control groups aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive versus active Stage of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>57 (26)</td>
<td>8 (4)</td>
<td>49 (22)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>163 (74)</td>
<td>62 (28)</td>
<td>101 (46)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; M</td>
<td>62 (29)</td>
<td>9 (4)</td>
<td>53 (25)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
There was no significant difference reported between the inactive staged intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 1.08, 95% CI = 0.67-1.76; see Table T.20).

**Table T.20:** A comparison between the number of inactive intervention and control group participants aged over 40 years who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by &gt;=1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>163 (74)</td>
<td>62 (28)</td>
<td>101 (46)</td>
<td>0.05</td>
</tr>
<tr>
<td>control group</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
<td>0.82</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of increasing physical activity by at least 1-hour classified by stage change (Model Fit; $X^2 = 11.37, p = 0.01$ (-2 log likelihood = 391.5)). The model retained baseline intention and baseline activity level. However, the only significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline were; i. baseline intention within the next month (OR = 1.89, 95% CI = 1.03-3.48) and ii. baseline activity level <15-minutes (OR = 2.17, 95% CI = 1.20-3.85) compared to baseline activity ≥70-minutes per week. The other variables retained in the model (baseline activity level ≥15 to 70-minutes per week and baseline intention within the next 6-months) were not independently significant predictors of change (see Table T.21).
Table T.21: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously sedentary baseline sample categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention (none)</td>
<td>0.00</td>
<td>0.00</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.64</td>
<td>0.31</td>
<td>0.04</td>
<td>1.89 (1.03-3.48)</td>
</tr>
<tr>
<td>intention (6-months)</td>
<td>0.54</td>
<td>0.31</td>
<td>0.09</td>
<td>1.71 (0.93-1.13)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td>-0.45</td>
<td>0.29</td>
<td>0.12</td>
<td>0.64 (0.36-1.13)</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min/wk)</td>
<td>-0.77</td>
<td>0.30</td>
<td>0.01</td>
<td>0.46 (0.26-0.83)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: group allocation (p = 0.9); gender (p = 0.6); education (p = 0.6); marital status (p = 0.3); language (p = 0.4); age (p = 0.9); employment status (p = 0.4); child at home (p = 0.4); BMI (p = 0.9).

T.7.3 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stage of Change

A significant number of the sedentary staged intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the active staged intervention group participants (McNemars $X^2$ (1 n = 220) = 12.25, $p < 0.001$; see Table T.16). A similar significant result was observed in the control group (McNemars $X^2$ (1 n = 214) = 10.78, $p < 0.001$; see Table T.22).

Table T.22: Proportion of the intervention and control groups who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary versus active Stage of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>114 (52)</td>
<td>32 (15)</td>
<td>82 (37)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>106 (48)</td>
<td>38 (17)</td>
<td>68 (31)</td>
</tr>
<tr>
<td>control group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>117 (55)</td>
<td>31 (15)</td>
<td>86 (40)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>97 (45)</td>
<td>33 (15)</td>
<td>64 (30)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Consistent with the results reported above, there was no significant difference reported between the sedentary staged intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 1.08, 95% CI = 0.58-2.01; see Table T.23).

**Table T.23:** A comparison between the number of sedentary intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by &gt;=1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>106 (48)</td>
<td>38 (17)</td>
<td>68 (31)</td>
<td>0.16</td>
</tr>
<tr>
<td>control group</td>
<td>97 (45)</td>
<td>33 (15)</td>
<td>64 (30)</td>
<td>(0.90)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of alternate stage change*. There were no statistically significant predictors suggested from the logistic regression model (Model Fit; $X^2 = 3.43$, $p = 0.06$ (-2 log likelihood = 248.3)). The model retained baseline intention, however, the neither aspect of the variable was an independently significant predictor of change (see Table T.24).

**Table T.24:** Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously sedentary baseline sample categorised by sedentary Stage of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention (none)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intention (next month)</td>
<td>0.56</td>
<td>0.31</td>
<td>0.07</td>
<td>1.76 (0.96-3.25)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation ($p = 0.9$); gender ($p = 0.4$); education ($p = 0.4$); marital status ($p = 0.8$); language ($p = 0.5$); age ($p = 0.8$); employment status ($p = 1.0$); child at home ($p = 0.9$); BMI ($p = 0.7$); baseline activity level ($p = 0.3$)

* Variable baseline activity status was recoded according to the trichotomous distribution in the sedentary stage participants (0-minutes per week, >0 to 60-minutes per week and ≥60-minutes per week).
T.8 Changes in reported physical activity at 8-months adjusted to baseline level

Results presented in this section examine the number of participants in each study group who reported at least a 1 hour increase in their total physical activity between baseline and 8-months. Further examination of the data classified participants as either inadequately active or adequately active, based on energy expenditure or stage change between baseline and 8-months and the number of those participants who report the 1-hour increase in total physical activity.

T.8.1 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

A significant number of the inadequately active intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared the adequately active intervention group participants (McNemars $X^2 (1 \ n = 229) = 8.88, p <= 0.01$; see Table T.25). However, this was not observed in the control groups' inadequately active baseline participants (McNemars $X^2 (1 \ n = 225) = 0.56, p = 0.46$; see Table T.25).

Table T.25: A comparison between intervention and control groups adequately and inadequately active baseline participants aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 8-months

<table>
<thead>
<tr>
<th>groups classified by energy expenditure category</th>
<th>baseline</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months</th>
<th>other *</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group n= 229</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>62 (28)</td>
<td>6 (3)</td>
<td>51 (22)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>163 (72)</td>
<td>87 (38)</td>
<td>85 (37)</td>
</tr>
<tr>
<td>control group n=225</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adequately active</td>
<td>57 (45)</td>
<td>9 (4)</td>
<td>53 (24)</td>
</tr>
<tr>
<td>inadequately active</td>
<td>172 (75)</td>
<td>62 (28)</td>
<td>101 (45)</td>
</tr>
</tbody>
</table>

* reported physical activity increased by <1-hour, remained the same or decreased by any amount

Further analysis between the two study groups inadequately active participants at baseline who reported at least a 1-hour increase in total physical activity between
baseline and 8-months was conducted. The inadequately active intervention group participants at baseline were 1.67 times (95% CI = 1.05-2.64) to increase their total physical activity by at least 1-hour between baseline and 8-months compared to the inadequately active control group participants at baseline (see Table T.26).

Table T.26: A comparison of the inadequately active baseline intervention and control group participants aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 8-months

<table>
<thead>
<tr>
<th>inadequately active</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥ 1-hour at 2-months n (%)</th>
<th>other n (%)</th>
<th>X²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>163 (72)</td>
<td>87 (38)</td>
<td>85 (37)</td>
<td>4.84</td>
<td>0.03</td>
</tr>
<tr>
<td>control group</td>
<td>172 (75)</td>
<td>62 (28)</td>
<td>101 (45)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months (Model Fit; $X^2 = 36.13$, $p < 0.001$ ($-2 \log$ likelihood = 411.8)). The model retained group allocation, baseline intention, and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inadequately active participants at baseline were; i. being in the intervention group (OR = 1.84, 95% CI = 1.15-2.95), ii. baseline Intention to be more active within the next month (OR = 2.08, 95% CI = 1.18-3.66), iii. baseline activity level <15-minutes (OR = 3.84, 95% CI = 2.08-7.14) compared to baseline activity ≥70-minutes per week. The other variables (baseline activity level ≥15 to 70-minutes per week and baseline intention within the next 6-months) were not independently significant predictors of change (see Table T.27).
Table T.27: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active participants aged over 40 years categorised by inadequate energy expenditure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (intervention)</td>
<td>0.61</td>
<td>0.24</td>
<td>0.01</td>
<td>1.84 (1.15-2.95)</td>
</tr>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.73</td>
<td>0.29</td>
<td>0.01</td>
<td>2.08 (1.19-3.66)</td>
</tr>
<tr>
<td>intention (6-months)</td>
<td>0.38</td>
<td>0.29</td>
<td>0.19</td>
<td>1.47 (0.83-2.58)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min /wk)</td>
<td>-0.28</td>
<td>0.28</td>
<td>0.33</td>
<td>0.76 (0.44-1.31)</td>
</tr>
<tr>
<td>baseline activity (≥ 70 min /wk)</td>
<td>-1.35</td>
<td>0.31</td>
<td>0.00</td>
<td>0.26 (0.14-0.48)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender \((p = 0.7)\); marital status \((p = 0.9)\); language \((p = 0.4)\); age \((p = 0.9)\); employment status \((p = 0.7)\); child at home \((p = 1.0)\); BMI \((p = 0.8)\).

T.8.2 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by inactive Stage of Change

A significant number of the inactive staged intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared the active staged intervention group participants \((\text{McNemars } X^2 (1 n = 229) = 60.99, p < 0.001; \text{ see Table T.16})\). A similar significant result was observed in the control group \((\text{McNemars } X^2 (1 n = 225) = 67.44, p < 0.001; \text{ see Table T.28})\).
Table T.28: Proportion of the intervention and control groups aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive versus active Stage of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>intervention group</th>
<th>control group</th>
<th>other*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline n (%)</td>
<td>reported physical activity increased by ≥1-hour n (%)</td>
<td>other n (%)</td>
</tr>
<tr>
<td>A &amp; M</td>
<td>57 (26)</td>
<td>6 (3)</td>
<td>51 (23)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>163 (74)</td>
<td>84 (38)</td>
<td>79 (36)</td>
</tr>
<tr>
<td>A &amp; M</td>
<td>62 (29)</td>
<td>9 (4)</td>
<td>53 (25)</td>
</tr>
<tr>
<td>PC, C &amp; P</td>
<td>152 (71)</td>
<td>29 (28)</td>
<td>93 (44)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless a significant difference reported between the inactive staged intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months. Whereby the inactive stage d intervention group participants were 1.68 times (95% CI = 1.04-2.69) more likely to report at least a 1-hour increase in total physical activity between baseline and 8-months compared to the inactive staged control group participants (see Table T.29).

Table T.29: A comparison between the number of inactive intervention and control group participants aged over 40 years who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by inactive Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by &gt;=1-hour n (%)</th>
<th>other* n (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>163 (74)</td>
<td>84 (38)</td>
<td>79 (36)</td>
<td>4.63</td>
</tr>
<tr>
<td>control group</td>
<td>152 (71)</td>
<td>29 (28)</td>
<td>93 (44)</td>
<td>0.03</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months (Model Fit; $X^2 = 33.87$, $p < 0.001$ (-2 log likelihood = 389.0)). The model retained group allocation, gender, baseline intention and baseline activity status but not all were individually significantly
predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline were; i. being in the intervention group (OR = 1.90, 95% CI = 1.18-3.04), ii. baseline activity level <15-minutes (OR = 2.78, 95% CI = 1.52-5.00) compared to baseline activity ≥70-minutes per week, and iii. baseline intention in the next month (OR = 2.15, 95% CI = 1.18-3.97) The other variables (gender, baseline activity level ≥15 to 70-minutes per week and baseline intention in the next 6-months) were not an independently significant predictors of change (see Table T.30).

Table T.30: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active participants aged over 40 years categorised by sedentary Stage of Change

<table>
<thead>
<tr>
<th>Variable†</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>0.64</td>
<td>0.24</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (intervention)</td>
<td>0.45</td>
<td>0.26</td>
<td>0.09</td>
<td>1.57 (0.96-2.61)</td>
</tr>
<tr>
<td>gender (female)</td>
<td>0.77</td>
<td>0.31</td>
<td>0.01</td>
<td>2.15 (1.18-3.97)</td>
</tr>
<tr>
<td>gender (male)</td>
<td>0.46</td>
<td>0.31</td>
<td>0.13</td>
<td>1.59 (0.86-2.91)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td>-0.16</td>
<td>0.29</td>
<td>0.59</td>
<td>0.85 (0.48-1.50)</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td>-1.02</td>
<td>0.31</td>
<td>0.00</td>
<td>0.36 (0.20-0.66)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td>-1.02</td>
<td>0.31</td>
<td>0.00</td>
<td>0.36 (0.20-0.66)</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min /wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (≥ 70 min /wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variables excluded from the model: marital status (p = 0.6); language (p = 0.4); age (p = 1.0); employment status (p = 0.9); child at home (p = 0.5); BMI (p = 0.6; education (p = 0.3).

T.8.3 A comparison between the intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by sedentary Stage of Change

A non-significant number of the sedentary staged intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared the active staged intervention group participants
(McNemars $X^2$ (1 $n = 220$) = 2.39, $p = 0.12$; see Table T.16). However, there was a significant number of the sedentary staged control group participants at baseline report at least a 1-hour increase in total physical activity between baseline and 8-months (McNemars $X^2$ (1 $n = 214$) = 0.08, $p < 0.01$; see Table T.31).

Table T.31: Proportion of the intervention and control group participants aged over 40 years who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary versus active Stage of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>114 (52)</td>
<td>39 (18)</td>
<td>75 (34)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>106 (48)</td>
<td>51 (23)</td>
<td>55 (25)</td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P, A &amp; M</td>
<td>117 (55)</td>
<td>34 (16)</td>
<td>83 (39)</td>
</tr>
<tr>
<td>PC &amp; C</td>
<td>97 (45)</td>
<td>34 (16)</td>
<td>63 (29)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

However, there was no significant difference observed between the two study groups in terms of their sedentary staged participants at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 1.72, 95%CI = 0.94–3.15; see Table T.32).

Table T.32: A comparison between the number of sedentary intervention and control group participants aged over 40 who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by sedentary Stage of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>reported physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intervention group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>106 (48)</td>
<td>51 (23)</td>
<td>55 (25)</td>
<td>3.03</td>
<td></td>
</tr>
<tr>
<td><strong>control group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>97 (45)</td>
<td>34 (16)</td>
<td>63 (29)</td>
<td>(0.08)</td>
<td></td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of alternate stage change(Model Fit; $X^2 = 16.34$, $p = 0.001$ (-2 log likelihood = 250.1)). The model retained group allocation,
education and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline were; i. being in the intervention group (OR = 1.90, 95% CI = 1.05-3.41), ii. ≥10 years education (OR = 1.95, 95% CI = 1.06-3.59), iii. baseline activity level 0-minutes (OR = 2.22, 95% CI = 1.03-5.00) compared to baseline activity ≥60-minutes per week. The other variable (baseline activity level >0 to 60-minutes per week) was not an independently significant predictor of change (see Table T.33).

Table T.33: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inadequately active participants aged over 40 years categorised by sedentary Stage of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>0.64</td>
<td>0.30</td>
<td>0.03</td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (intervention)</td>
<td>0.67</td>
<td>0.31</td>
<td>0.03</td>
<td>1.90 (1.05-3.41)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>0.64</td>
<td>0.30</td>
<td>0.03</td>
<td>1.0</td>
</tr>
<tr>
<td>education (≥ 10-years)</td>
<td>0.67</td>
<td>0.31</td>
<td>0.03</td>
<td>1.95 (1.06-3.59)</td>
</tr>
<tr>
<td>baseline activity (0 mins/wk)</td>
<td>-0.05</td>
<td>0.41</td>
<td>0.91</td>
<td>1.05 (0.47-2.35)</td>
</tr>
<tr>
<td>baseline activity (≥ 60 min /wk)</td>
<td>-0.81</td>
<td>0.40</td>
<td>0.04</td>
<td>0.45 (0.20-0.97)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender (p = 0.7); marital status (p = 0.9); language (p = 0.4); age (p = 0.9); employment status (p = 0.7); child at home (p = 1.0); BMI (p = 0.8); baseline intention (p = 0.2)

T.9 Maintenance of behaviour change between 2 and 8-months between the intervention and control groups

The results presented in this Section are focused on those participants aged over 40 in the intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and then maintained that increase at 8-months. Out of the 229 intervention and 225 control group participants followed-up at 8-months, 45 intervention and 29 control participants who had maintained the initial 1-hour increase they reported at 2-months at the 8-month follow-up, however, the difference in proportions was not quite significant between groups (χ² (1, n = 454) = 3.3, p = 0.07).
The results presented in this Appendix are based on those participants who were aged over 40 years of age at baseline and recalled receiving the self-help print intervention (see Section 8.9 and Section 9.5 and is directly comparable to the results reported in Appendix T). Therefore, data from 157 and 146 intervention group participants’ were included in the 2- and 8-month data analysis respectively, and as before the original control group participants aged over 40 years at baseline were used as comparisons (see Table U.1).

Table U.1: Number of participants in the original intervention and control group participants aged over 40 years and the new TR intervention group

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>2-month</th>
<th>8-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>intervention group</td>
<td>229</td>
<td>213</td>
<td>199</td>
</tr>
<tr>
<td>TR intervention group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>control group</td>
<td>225</td>
<td>215</td>
<td>204</td>
</tr>
</tbody>
</table>

There were no significant differences between the TR intervention and control groups’ aged over 40 years in terms of their physical demographic or baseline physical activity data (see Table U.2). Therefore, the two groups were comparable.

Table U.2: Comparison between the TR intervention and control groups’ aged over 40 years mean baseline demographics and physical activity levels

<table>
<thead>
<tr>
<th></th>
<th>Sept 1997 (n = 157) TR intervention group</th>
<th>Sept 1997 (n = 225) control group</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gender (male)</td>
<td>32.5</td>
<td>39.6%</td>
<td>0.78*</td>
<td>0.38-</td>
</tr>
<tr>
<td>age (yrs)</td>
<td>48.2 ± 5.7</td>
<td>48.6 ± 6.2</td>
<td>0.64</td>
<td>0.52</td>
</tr>
<tr>
<td>height (m)</td>
<td>1.68 ± 0.10</td>
<td>1.69 ± 0.14</td>
<td>1.06</td>
<td>0.29</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>72.6 ± 15.3</td>
<td>73.5 ± 16.1</td>
<td>0.55</td>
<td>0.58</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.7 ± 4.8</td>
<td>25.7 ± 5.4</td>
<td>0.04</td>
<td>0.97</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>walking (hrs/wk)</td>
<td>1.37 ± 2.14</td>
<td>1.54 ± 2.28</td>
<td>0.76</td>
<td>0.23</td>
</tr>
<tr>
<td>moderate (hrs/wk)</td>
<td>0.26 ± 0.76</td>
<td>0.21 ± 0.72</td>
<td>-0.65</td>
<td>0.52</td>
</tr>
<tr>
<td>vigorous (hrs/wk)</td>
<td>0.24 ± 0.69</td>
<td>0.47 ± 1.68</td>
<td>1.60</td>
<td>0.11</td>
</tr>
<tr>
<td>total (hrs/wk)</td>
<td>1.86 ± 2.48</td>
<td>2.22 ± 2.93</td>
<td>1.22</td>
<td>0.22</td>
</tr>
</tbody>
</table>

* Yates Corrected Chi Square
U.1 Background media recall and impact in the TR intervention group

A similar number of health related media messages were recalled by the TR&R intervention and control groups’ at baseline, 2- and 6-months, with no significant differences noted (baseline $\chi^2 (1, n = 382) = 1.04, p = 0.31$), 2-months $\chi^2 (1, n = 372) = 0.12, p = 0.73$) or 8-months $\chi^2 (1, n = 350) = 0.86, p = 0.35$) follow-up data (see Figure U.1).

![Figure U.1: Frequency of recalling any health messages in the TR intervention and control group participants aged over 40 years at baseline, 2 and 8-months](image)

Furthermore, there were no significant differences between the number of TR intervention and control group participants aged over 40 who recalled specific physical activity related messages (see shaded Section of Table U.3) at; baseline (38% versus 43%; $p = 0.64$) 2-months (22% versus 16%; $p = 0.30$), or 8-months (17% verses 20%; $p = 0.72$). Both study groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation, these data are presented in Table U.3)
Table U.3: Unprompted message recall by the TR intervention and control groups at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2-months (n)</th>
<th>8-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>intervention*</td>
<td>21</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>control*</td>
<td>32</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'Active Over 50's'</td>
<td>control</td>
<td>8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>'Exercise: take it regularly not</td>
<td>control</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>seriously'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise and Heart</td>
<td>intervention</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Exercise and Diet</td>
<td>intervention</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>intervention</td>
<td>28</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>41</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>General Health</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Diet</td>
<td>intervention</td>
<td>-</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>intervention</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>intervention</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>intervention</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Community Events</td>
<td>intervention</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Smoking</td>
<td>intervention</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Can’t Recall</td>
<td>intervention</td>
<td>18</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>25</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

* intervention group n = 229.
# control group n = 225.
U.2 Changes in reported physical activity between baseline, 2 and 8-months

Consistent with the results presented in Appendix T, Section T.2 there was no significant effects shown for walking, moderate or total physical activity. However there was also no significant effect observed for the vigorous physical activity either (see Table U.4).

Table U.4: Mean physical activity times (hours per week) reported by the TR intervention (n = 157) and control (n = 225) group participants aged over 40 years at baseline, 2- and 8-months

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>8-months</th>
<th>F group</th>
<th>F time</th>
<th>F group x time</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>TR. intervention</td>
<td>1.37 (2.14)</td>
<td>1.56 (2.15)</td>
<td>1.48 (1.53)</td>
<td>0.05</td>
<td>0.14</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.54 (2.28)</td>
<td>1.41 (1.89)</td>
<td>1.56 (2.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>TR. intervention</td>
<td>0.26 (0.76)</td>
<td>0.24 (1.07)</td>
<td>0.32 (1.37)</td>
<td>0.03</td>
<td>0.54</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.21 (0.73)</td>
<td>0.39 (1.63)</td>
<td>0.26 (1.14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vigorous</td>
<td>TR. intervention</td>
<td>0.24 (0.69)</td>
<td>0.37 (1.01)</td>
<td>0.45 (1.11)</td>
<td>1.03</td>
<td>2.61</td>
<td>1.74</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.47 (1.67)</td>
<td>0.31 (0.77)</td>
<td>0.55 (1.50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>TR. intervention</td>
<td>1.87 (2.48)</td>
<td>2.18 (2.45)</td>
<td>2.25 (2.33)</td>
<td>0.35</td>
<td>1.11</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.21 (2.93)</td>
<td>2.12 (2.69)</td>
<td>2.32 (2.89)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

U.3 Proportion of the TR intervention group aged over 40 years who were meeting a criterion of sufficient physical activity per week at baseline, 2 and 8-months

Over two thirds of the TR intervention and control group (70% and 66% respectively) participants were classified as participating in less than 150-minutes of physical activity a week at baseline. Hence, there was no significant difference between the study groups at baseline (Yates Corrected $\chi^2$ (1, n = 382) = 0.46, $p = 0.50$; see Table U.5)
Table U.5: The number TR intervention group participating in at least 150-minutes of physical activity per week at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th></th>
<th>baseline</th>
<th>≥ 150-minutes</th>
<th>&lt; 150-minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>n = 157</td>
<td>25 (16)</td>
<td>22 (14)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>28 (18)</td>
<td>82 (52)</td>
</tr>
<tr>
<td></td>
<td>8-month n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR intervention group</td>
<td>n = 157</td>
<td>24 (15)</td>
<td>23 (15)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>31 (20)</td>
<td>79 (50)</td>
</tr>
</tbody>
</table>

There were no statistically significant changes within either study group in relation to the proportion of participants reaching the 150 minute criterion by 2-months (TR intervention; McNemars $X^2 (1, n = 157) = 0.50, p = 0.48$). Hence, there was also no significant difference between groups (Yates Corrected $X^2 (1, n = 382) = 0.99, p = 0.32$; see Section 10.7 for control group results).

Similar results were reported at the 8-month follow-up with no statistically significant differences observed within either groups (TR intervention group; McNemars $X^2 (1, n = 157) = 0.91, p = 0.34$) and no significant difference between groups (Yates Corrected $X^2 (1, n = 382) = 0.48, p = 0.49$).

U.4 Proportions expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

At baseline the TR intervention and control groups reported similar proportions of participants in each energy expenditure category (see Table U.6). Particularly in terms of adequate and inadequate energy expenditure categories (see Section 5.10.3.1), where the TR intervention group reported fewer participants in the adequate category (20%) compared to the control group (28%), although the difference was not significant ($X^2 (1, n = 382) = 0.0, p = 1.00$).
Table U.6: Changes in energy expenditure categories in the TR intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>TR intervention group n=157 n (%)</th>
<th>2-month</th>
<th>8-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>8 (5)</td>
<td>12 (8)</td>
<td>17 (11)</td>
</tr>
<tr>
<td>Moderate</td>
<td>23 (15)</td>
<td>32 (20)</td>
<td>31 (20)</td>
</tr>
<tr>
<td>Low</td>
<td>86 (55)</td>
<td>83 (53)</td>
<td>87 (55)</td>
</tr>
<tr>
<td>Sedentary</td>
<td>40 (26)</td>
<td>30 (19)</td>
<td>22 (14)</td>
</tr>
</tbody>
</table>

Similar results were reported at the 2-month follow-up where the TR intervention and control groups reported 28% and 29% of participants respectively were expending adequate amounts of energy from physical activity (see Table U.6). Further examination of the 2-month data (see Table U.7) showed that a non-significant number of TR intervention group participants who were classified as inadequately active at baseline became adequately active by 2-months (McNemars $X^2 (1, n = 157) = 2.72, p = 0.10$; see Section 10.8 for control group results).

Table U.7: Changes in adequate and inadequate energy expenditure categories in the TR intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>baseline energy expenditure</th>
<th>2-month energy expenditure n = 157 n (%)</th>
<th>8-month energy expenditure n = 157 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>33 (21)</td>
<td>93 (59)</td>
</tr>
<tr>
<td>adequate</td>
<td>11 (7)</td>
<td>20 (13)</td>
</tr>
<tr>
<td>inadequate</td>
<td>36 (23)</td>
<td>90 (57)</td>
</tr>
<tr>
<td>adequate</td>
<td>12 (8)</td>
<td>19 (12)</td>
</tr>
</tbody>
</table>

By the 8-month follow-up the control group reported 33% of the participants were expending adequate amounts of energy from physical activity, whereas the TR intervention group reported only 31% (see Table U.7) but this difference was not significant (Yates Corrected $X^2 (1, n = 382) = 0.21, p = 0.65$). Further examination of the 8-month energy expenditure change data showed a significant number of participants moving from inadequate to adequate activity categories in the TR intervention group (McNemars $X^2 (1, n = 157) = 4.66, p = 0.03$; see Table U.7).
U.5 Movement through the Stages of Change

There were slightly more (75%) TR intervention group participants staged in the early stages (P, C & P) compared to 696% in the control group at baseline (see Table U.8 and Appendix T, Table T.8).

Table U.8 Stage distribution within the TR intervention group at baseline and 8-months

<table>
<thead>
<tr>
<th>Stage</th>
<th>TR intervention group n=146 n (%) 8-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-contemplation</td>
<td>31 (21)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>38 (26)</td>
</tr>
<tr>
<td>Preparation</td>
<td>41 (28)</td>
</tr>
<tr>
<td>Action</td>
<td>10 (7)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>19 (13)</td>
</tr>
<tr>
<td>Relapse</td>
<td>7 (5)</td>
</tr>
<tr>
<td></td>
<td>30 (21)</td>
</tr>
<tr>
<td></td>
<td>32 (22)</td>
</tr>
<tr>
<td></td>
<td>39 (27)</td>
</tr>
<tr>
<td></td>
<td>13 (9)</td>
</tr>
<tr>
<td></td>
<td>29 (20)</td>
</tr>
<tr>
<td></td>
<td>3 (2)</td>
</tr>
</tbody>
</table>

There was a 7% increase in M and 2% increase in A between baseline and 8-months in the TR intervention group. However, the control group reported a greater increase of 9% increase in M, most of which resulted from a decrease in the A stage (5%; see Table U.8 and Appendix T, Table T.8).

U.5.1 Progression through the Stage of Change between baseline, 2 and 8-months

Data from all participants followed up at 2-months were used in this analysis (see Table U.9. There were no significant differences between the number of participants progressing at least one stage between groups up to 2-months ($\chi^2 (1, n = 372) = 0.25, p = 0.62; \text{OR} = 1.14, 95\%\text{CI} = 0.73-1.77$).

Table U.9: A comparison between the TR intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n=157*</td>
<td>67 (18)</td>
<td>90 (24)</td>
</tr>
<tr>
<td>control group n=215*</td>
<td>85 (23)</td>
<td>130 (35)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2- and 8-months with participants in Relapse removed
Data from all participants followed up at 8-months were used in this analysis (see Table U.10). There were no significant differences between the number of participants progressing at least one stage between groups up to 8-months ($X^2 (1, n = 350) = 0.03, p = 0.87; OR = 1.07, 95%CI = 0.38-1.68$).

Table U.10: A comparison between the TR intervention and control group participants who progressed at least one stage between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group n=146</td>
<td>68 (19)</td>
<td>78 (22)</td>
</tr>
<tr>
<td>control group n=204*</td>
<td>92 (26)</td>
<td>112 (32)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2- and 8-months with participants in Relapse removed

U.5.2 Movement through the Stage of Change from the inactive stages to the active stages between baseline, 2 and 8-months

Of the 118 participants in the TR intervention group who were in P, C & P combined 29 had moved into the A & M group by 2-months, however, this was not statistically significant (McNemars $X^2 (1, n = 148) = 1.69; p = 0.19$) compared to the 19 out of 30 participants moving from A & M to P, C & P (see Table U.11).

Table U.11: Movement from inactive to active Stages of Change within the TR intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th></th>
<th>Stage at baseline</th>
<th>Stage at 2-months n (%)</th>
<th>Stage at 8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group*</td>
<td>PC, C &amp; P</td>
<td>29 (20)</td>
<td>89 (60)</td>
</tr>
<tr>
<td>n = 148</td>
<td>A &amp; M</td>
<td>11 (7)</td>
<td>19 (13)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2- and 8-months with participants in Relapse removed

Of the 108 participants in the TR intervention group who were in P, C & P combined 30 had moved into the A & M group by 8-months, however, this was not statistically significant (McNemars $X^2 (1, n = 136) = 2.52; p = 0.11$) compared to the 10 out of 28 participants moving from A & M to P, C & P (see Table U.11).
U.5.3 Movement through the Stage of Change from the sedentary stages to the active stages between baseline, 2 and 8-months

Of the 77 participants in the intervention group who were in PC & C combined 34 had moved into the P, A & M group by 2-months, however, this was not statistically significant (McNemars $\chi^2 (1, n = 148) = 0.25; p = 0.61$) compared to the 29 out of 71 participants moving from P, A & M to PC & C (see Table U.12).

Table U.12: Movement from sedentary to active Stages of Change within the TR intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>TR intervention group n = 148</th>
<th>baseline</th>
<th>2-months n (%)</th>
<th>8-months n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PC &amp; C</td>
<td>P, A &amp; M</td>
<td>PC &amp; C</td>
</tr>
<tr>
<td></td>
<td>34 (23)</td>
<td>43 (29)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>42 (28)</td>
<td>29 (20)</td>
<td></td>
</tr>
<tr>
<td>TR intervention group n = 136</td>
<td>PC &amp; C</td>
<td>38 (28)</td>
<td>29 (21)</td>
</tr>
<tr>
<td></td>
<td>P, A &amp; M</td>
<td>38 (28)</td>
<td>31 (23)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 8-months with participants in Relapse removed

Of the 67 participants in the intervention group who were in PC & C combined 38 had moved into the P, A & M group by 8-months, however, this was not statistically significant (McNemars $\chi^2 (1, n = 136) = 0.52, p = 0.47$) compared to the 31 out of 69 participants moving from P, A & M to PC & C (see Table U.12).

U.6 Changes in reported physical activity at 2-months adjusted to baseline level

Results presented in this section examine the number of participants in each study group who reported at least a 1 hour increase in their total physical activity between baseline and 2-months. Further examination of the data classifies participants as either inadequately active or adequately active, based on energy expenditure or stage change between baseline and 2-months and the number of those participants who report the 1-hour increase in total physical activity.
U.6.1 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

A significant number of the inadequately active TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the adequately active intervention group participants (McNemars $X^2 (1 n = 157) = 5.16, p = 0.02$; see Table T.16). A non-significant result was observed in the control group (see Appendix T, Section T.7.1).

Table U.13: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>physical activity increased by $\geq$ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>31 (20)</td>
<td>6 (4)</td>
<td>25 (16)</td>
</tr>
<tr>
<td>inadequate</td>
<td>126 (80)</td>
<td>45 (29)</td>
<td>81 (52)</td>
</tr>
</tbody>
</table>

  * other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.

However, there was no significant difference between the TR intervention and control groups inadequately active baseline sample who increased their total physical activity status by at least 1-hour between baseline and 2-months (OR = 1.03; 95% CI = 0.62-1.73; see Table U.14).

Table U.14: A comparison between the number of inadequately active TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by $\geq$ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>$X^2$ (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>126 (80)</td>
<td>45 (29)</td>
<td>81 (52)</td>
<td>0.00</td>
</tr>
<tr>
<td>control group</td>
<td>163 (72)</td>
<td>57 (25)</td>
<td>106 (47)</td>
<td>0.99</td>
</tr>
</tbody>
</table>

  * other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inadequately active participants at baseline. However, the model was not significant, hence all variables were removed from the model (Model Fit; $X^2 = -3.11, p = 0.21$ ($-2 \text{ log likelihood} = 366.4$)). Therefore, there were no significant predictors of increasing physical activity by at least 1-hour between baseline and 2-months in the inadequately active baseline participants.

**U.6.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change**

A significant number of the inactive staged TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the active staged intervention group participants (McNemars $X^2 (1 n = 214) = 60.01, p < 0.001$; see Table T.16). A similar significant result was observed in the control group (see Appendix T, Section T.6.2).

**Table U.15: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive verses active Stages of Change**

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by $\geq$ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>62 (29)</td>
<td>9 (4)</td>
<td>53 (25)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
</tr>
</tbody>
</table>

*other = those participants whose reported physical activity increased by $< 1$-hour or decreased by any amount.

There was no significant difference observed between the number of TR intervention and control group participants who were inactive by stage category at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.93, 95%CI = 0.54-1.58; see Table U.16).

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Table U.16: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X^2 (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
<td>0.03</td>
</tr>
<tr>
<td>control group</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
<td>0.87</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

As before, backward stepwise logistic regression was conducted to determine if there were any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants at baseline. However, the model was not significant (Model Fit; $X^2 = -1.97, p = 0.16$ (-2 log likelihood = 344.3)). Hence, there were no significant predictors of adopting an extra hour of physical activity between baseline and 2-months, as classified by the inactive Stages of Change.

U.6.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

A significant number of the sedentary staged TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the active staged intervention group participants (McNemars $X^2 (1 n = 150) = 11.37, p < 0.001$; see Table T.16). A similar significant result was observed in the control group (see Appendix T, Section T.6.3).

Table U.17: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>73 (48.7)</td>
<td>22 (15)</td>
<td>51 (34)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>77 (51.3)</td>
<td>25 (17)</td>
<td>52 (35)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount
There was no significant difference observed between the number of TR intervention and control group participants who were sedentary by stage category at baseline and increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.93, 95%CI = 0.47-1.85; see Table U.18).

Table U.18: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>77 (51.3)</td>
<td>25 (17)</td>
<td>52 (35)</td>
<td>0.03</td>
</tr>
<tr>
<td>control group</td>
<td>97 (45)</td>
<td>33 (15)</td>
<td>64 (30)</td>
<td>(0.96)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

As before, backward stepwise logistic regression was conducted to determine if there were any significant predictors increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline. The model retained gender in the model but was not quite independently significant (Model Fit; X² = 3.58, p = 0.06 (-2 log likelihood = 211.9); see Table U.19).

Table U.19: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (female)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>gender (male)</td>
<td>-0.67</td>
<td>0.36</td>
<td>0.06</td>
<td>0.51 (0.25-1.04)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation (p = 0.6); education (p = 1.0); marital status (p = 0.6); language (p = 0.8); age (p = 0.6); employment status (p = 0.8); child at home (p = 0.3); BMI (p=0.5); baseline activity (p = 0.2); baseline intention (p = 0.1).
U.7 Changes in reported physical activity at 8-months adjusted to baseline level

Results presented in this section examine the number of participants in each study group who reported at least a 1 hour increase in their total physical activity between baseline and 8-months. Further examination of the data classifies participants as either inadequately active or adequately active, based on energy expenditure or stage change between baseline and 8-months and the number of those participants who report the 1-hour increase in total physical activity.

U.7.1 A comparison between the TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

A significant number of the inadequately active TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the adequately active intervention group participants ($\chi^2 (1 n = 157) = 11.51, p < 0.01$; see Table T.20).

A significant result was also observed in the control group (see Appendix T, Section T.8.1).

Table U.20: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>31 (20)</td>
<td>3 (2)</td>
<td>28 (18)</td>
</tr>
<tr>
<td>inadequate</td>
<td>126 (80)</td>
<td>61 (39)</td>
<td>65 (41)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was no significant difference between the TR intervention and control groups inadequately active baseline sample who increased their total physical activity status by at least 1-hour between baseline and 8-months ($OR = 1.53, 95\% CI = 0.93-2.52$; see Table U.21).
Appendix U

Table U.21: A comparison between the number of inadequately active TR intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group*</td>
<td>126 (80)</td>
<td>61 (39)</td>
<td>65 (41)</td>
<td>2.72</td>
</tr>
<tr>
<td>control group*</td>
<td>172 (75)</td>
<td>62 (28)</td>
<td>101 (45)</td>
<td>(0.10)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of change of increasing total physical activity by at least 1-hour between baseline and 2-months in the inadequately active participants at baseline. The model retained group allocation, language spoken at home, baseline intention, and baseline activity status but not all were individually significantly predictors (Model Fit; $X^2 = 28.90, p < 0.001$ (-2 log likelihood = 357.5)). The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inadequately active participants at baseline were; i. being in the TR intervention group (OR = 1.71, 95% CI = 1.03-2.86), ii. baseline intention to be more active within the next month (OR = 1.93, 95% CI = 1.05-3.55), iii. baseline activity level <15-minutes (OR = 3.33, 95% CI = 1.72-3.25) compared to baseline activity ≥70-minutes per week. The other variables (language spoken at home, baseline activity level ≥15 to 70-minutes per week and baseline intention within the next 6-months) were not independently significant predictors of change (see Table U.22)
Table U.22: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inadequately active participants aged over 40 years categorised by inadequate energy expenditure

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.54</td>
<td>0.26</td>
<td>0.04</td>
<td>0.71 (1.03-2.86)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td>1.78</td>
<td>1.09</td>
<td>0.10</td>
<td>5.93 (0.70-50.22)</td>
</tr>
<tr>
<td>language (English)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>intention (none)</td>
<td>0.66</td>
<td>0.31</td>
<td>0.03</td>
<td>1.93 (1.05-3.55)</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.38</td>
<td>0.32</td>
<td>0.24</td>
<td>1.46 (0.78-2.74)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min /wk)</td>
<td>-0.44</td>
<td>0.30</td>
<td>0.15</td>
<td>0.64 (0.36-1.16)</td>
</tr>
<tr>
<td>baseline activity (≥ 70 min /wk)</td>
<td>-1.20</td>
<td>0.33</td>
<td>0.00</td>
<td>0.30 (0.16-0.58)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender (p = 0.5); marital status (p = 0.9); age (p = 0.8); employment status (p = 0.7); child at home (p = 1.0); BMI (p = 0.6); education (p = 0.3).

U.7.2 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

A significant number of the inactive staged TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared the active staged intervention group participants (McNemars $X^2$ (1 n = 214) = 60.01, p < 0.001; see Table T.23). A similar significant result was observed in the control group (see Appendix T, Section T.8.2).

Table U.23: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>62 (29)</td>
<td>9 (4)</td>
<td>53 (25)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
There was no significant difference was observed between the number of TR intervention and control group participants who were inactive by stage category at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 0.93, 95%CI = 0.54-1.58; see Table U.24).

Table U.24: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention group</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
<td>0.03</td>
</tr>
<tr>
<td>control group</td>
<td>152 (71)</td>
<td>29 (28)</td>
<td>93 (44)</td>
<td>0.87</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months (Model Fit; \( X^2 = 19.13, p < 0.001 \) (-2 log likelihood = 345.3)). The model retained group allocation, language spoken at home and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. being in the TR intervention group (OR = 1.77, 95% CI = 1.06-2.94), ii. baseline activity level <15-minutes (OR = 2.56, 95% CI = 1.37-4.76) compared to baseline activity ≥70-minutes per week. The other variables (language spoken at home and baseline activity level ≥15 to 70-minutes per week) were not independently significant predictors of change (see Table U.25).
Table U.25: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inadequately active participants aged over 40 years categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.57</td>
<td>0.26</td>
<td>0.03</td>
<td>1.77 (1.06-2.94)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (English)</td>
<td>1.87</td>
<td>1.07</td>
<td>0.08</td>
<td>6.51 (0.80-52.84)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min /wk)</td>
<td>-0.32</td>
<td>0.31</td>
<td>0.31</td>
<td>0.73 (0.40-1.33)</td>
</tr>
<tr>
<td>baseline activity (≥ 70 min /wk)</td>
<td>-0.94</td>
<td>0.32</td>
<td>0.00</td>
<td>0.39 (0.21-0.73)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender (p = 0.4); marital status (p = 0.6); age (p = 0.9); employment status (p = 0.8); child at home (p = 0.8); BMI (p = 0.6; education (p = 0.3); baseline intention (p = 0.2).

U.7.3 A comparison between the TR intervention and control group participants who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

A non-significant number of the sedentary staged TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared the active staged intervention group participants (McNemars $X^2 (1 n = 150) = 2.93, p = 0.09$; see Table T.26).

A similar non-significant result was observed in the control group (see Appendix T, Section T.8.3).

Table U.26: Proportion of the TR intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary verses active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>73 (49)</td>
<td>26 (17)</td>
<td>47 (31)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>77 (51)</td>
<td>36 (24)</td>
<td>41 (27)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

There was no significant difference observed between the number of TR intervention and control group participants who were inadequately active at
baseline (by alternate stage category) and increased their total physical activity by at least 1-hour at 8-months (OR = 1.63, 95%CI = 0.84-3.14; see Table U.27).

Table U.27: A comparison between the number of inactive TR intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR intervention</td>
<td>77 (51)</td>
<td>36 (24)</td>
<td>41 (27)</td>
<td>1.98</td>
</tr>
<tr>
<td>control group</td>
<td>97 (45)</td>
<td>34 (16)</td>
<td>63 (29)</td>
<td>(0.16)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Nonetheless as before, logistic regression was conducted to determine if there were any significant predictors of alternate stage change (Model Fit; $X^2 = 15.58, p = 0.001$ (-2 log likelihood = 214.0)). The model retained group allocation, education and baseline activity level but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline were; i. being in the TR intervention group (OR = 1.96, 95% CI = 1.02-3.73), ii. ≥10 years education (OR = 2.41, 95% CI = 1.26-4.60). The other variable (baseline activity level) was not an independently significant predictor of change (see Table U.28).

Table U.28: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.68</td>
<td>0.33</td>
<td>0.04</td>
<td>1.96 (1.02-3.73)</td>
</tr>
<tr>
<td>education (&lt; 10-years)</td>
<td>0.88</td>
<td>0.33</td>
<td>0.01</td>
<td>2.41 (1.26-4.60)</td>
</tr>
<tr>
<td>education (≥ 10-years)</td>
<td>0.36</td>
<td>0.46</td>
<td>0.43</td>
<td>1.44 (0.58-3.53)</td>
</tr>
<tr>
<td>baseline activity (≥ 60 min/wk)</td>
<td>-0.48</td>
<td>0.44</td>
<td>0.27</td>
<td>0.62 (0.26-1.47)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender ($p = 0.9$); marital status ($p = 0.8$); language ($p = 0.2$); age ($p = 0.4$); employment status ($p = 0.8$); child at home ($p = 0.9$); BMI ($p=0.5$); baseline intention ($p = 0.2$).
U.8 Maintenance of behaviour change between 2 and 8-months between the TR intervention and control groups

The results presented in this Section are focused on those participants aged over 40 in the TR intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and then maintained that increase at 8-months. Out of the 157 intervention and 225 control group participants followed-up at 8-months, 27 intervention and 29 control participants who had maintained the initial 1-hour increase they reported at 2-months at the 8-month follow-up, however, the difference in proportions was not significant between groups ($X^2 (1, n = 382) = 1.0, p = 0.31$).
Appendix V

NSW RCT
over 40’s
Treatment Received & Read results
The results presented in this Appendix are based on those intervention group participants' who were over 40 years of age at baseline and reported actually receiving and reading the self-help print intervention (see Section 8.9, Section 9.5 and is directly comparable to the results reported in Appendix U). Data from 138 and 130 intervention group participants' were included in the 2 and 8-month data analysis respectively, and as before the original control group participants aged over 40 years at baseline were used as comparisons (see Table V.1).

| Table V.1: Number of participants in the original intervention and control group participants aged over 40 years and the new TR&R intervention group |
|-----------------|-------|-------|
|                 | baseline | 2-month | 8-month |
| intervention group | 229     | 213     | 199     |
| TR&R intervention group | 225     | 138     | 130     |
| control group     | 225     | 215     | 204     |

There were no significant differences between the TR&R intervention and control groups' aged over 40 years in terms of their physical demographic or baseline physical activity data (see Table V.2). Therefore, the two groups were comparable.

| Table V.2: Comparison between the TR&R intervention and control groups' aged over 40 years mean baseline demographics and physical activity levels |
|-----------------|-------|-------|-------|-------|
|                 | Sept 1997 n = 138 TR&R intervention group | Sept 1997 n = 225 control group | t-value | p-value |
| Demographics    |       |       |       |       |
| gender (male)   | 30.4  | 39.6% | 1.78* | 0.18  |
| age (yrs)       | 48.3 ± 5.7 | 48.6 ± 6.2 | 0.52   | 0.61  |
| height (m)      | 1.68 ± 0.10 | 1.69 ± 0.14 | 1.21   | 0.23  |
| mass (kg)       | 72.7 ± 15.2 | 73.5 ± 16.1 | 0.48   | 0.63  |
| BMI (kg/m²)     | 25.8 ± 4.8  | 25.7 ± 5.4  | -0.19  | 0.85  |
| Physical activity |       |       |       |       |
| walking (hrs/wk)| 1.29 ± 1.96 | 1.54 ± 2.28 | 1.09   | 0.27  |
| moderate (hrs/wk)| 0.27 ± 0.78 | 0.21 ± 0.72 | -0.77  | 0.44  |
| vigorous (hrs/wk)| 0.27 ± 0.73 | 0.47 ± 1.68 | 1.30   | 0.19  |
| total (hrs/wk)  | 1.83 ± 2.39 | 2.22 ± 2.93 | 1.32   | 0.19  |

* Yates Corrected Chi Square
Appendix V

V.1 Background media recall and impact in the TR&R intervention group

A similar number of health related media messages were recalled by the TR&R intervention and control groups' at baseline, 2 and 6-months, with no significant differences noted (baseline \( \chi^2 (1, n = 363) = 1.21, p = 0.27 \), 2-months \( \chi^2 (1, n = 353) = 0.60, p = 0.44 \)) or 8-months \( \chi^2 (1, n = 334) = 0.67, p = 0.41 \) follow-up data (see Figure V.1).

![Figure V.1: Frequency of recalling any health messages in the TR&R intervention and control group participants aged over 40-years at baseline, 2 and 8-months](image)

Furthermore, there were no significant differences between the number of TR&R intervention and control group participants aged over 40 who recalled specific physical activity related messages (see shaded Section of Table V.3) at; baseline (31% versus 43%; \( p = 0.17 \)) 2-months (23% versus 16%; \( p = 0.21 \)), or 8-months (17% versus 20%; \( p = 0.66 \)). Both study groups also recalled other health messages, such as diet and smoking, which would not directly influence physical activity participation, these data are presented in Table V.3)
Table V.3: Unprompted message recall by the TR&R intervention and control groups at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Message recall</th>
<th>group</th>
<th>baseline (n)</th>
<th>2-months (n)</th>
<th>8-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise for Health</td>
<td>intervention*</td>
<td>18</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>32</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'no ifs...no buts'</td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>'Active Over 50's'</td>
<td>control</td>
<td>17</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Campaign</td>
<td>intervention</td>
<td>-</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>'Exercise: take it regularly not seriously'</td>
<td>control</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Exercise and Heart</td>
<td>intervention</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Exercise and Diet</td>
<td>intervention</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Exercise Machines</td>
<td>intervention</td>
<td>44</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>41</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>General Health</td>
<td>intervention</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Diet</td>
<td>intervention</td>
<td>-</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Life Be In It</td>
<td>intervention</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>intervention</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>intervention</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Community Events</td>
<td>intervention</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Smoking</td>
<td>intervention</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>-</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Can't Recall</td>
<td>intervention</td>
<td>17</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>25</td>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

* intervention group n = 229

# control group n = 225
Appendix V

V.2 Changes in reported physical activity between baseline, 2 and 8-months

Consistent with the results presented in Appendix T, Section T.2 there was no significant effects for walking, moderate or total physical activity. However there was also no significant effect observed for the vigorous physical activity either (see Table V.4).

Table V.4: Mean physical activity times (hours per week) reported by the TR&R intervention (n = 138) and control (n = 225) group participants aged over 40 years at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>group</th>
<th>baseline</th>
<th>2-months</th>
<th>8-months</th>
<th>F group</th>
<th>F time</th>
<th>F group x time</th>
</tr>
</thead>
<tbody>
<tr>
<td>walking</td>
<td>TR&amp;R intervention</td>
<td>1.29</td>
<td>1.46</td>
<td>1.46</td>
<td>0.44</td>
<td>0.31</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>1.54</td>
<td>1.41</td>
<td>1.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.96)</td>
<td>(1.84)</td>
<td>(1.48)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.28)</td>
<td>(1.89)</td>
<td>(2.01)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>TR&amp;R intervention</td>
<td>0.27</td>
<td>0.24</td>
<td>0.33</td>
<td>0.00</td>
<td>0.41</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.21</td>
<td>0.39</td>
<td>0.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.78)</td>
<td>(1.09)</td>
<td>(1.44)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.73)</td>
<td>(1.63)</td>
<td>(1.14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vigorous</td>
<td>TR&amp;R intervention</td>
<td>0.27</td>
<td>0.36</td>
<td>0.45</td>
<td>0.76</td>
<td>2.23</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>0.47</td>
<td>0.31</td>
<td>0.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.73)</td>
<td>(1.00)</td>
<td>(1.12)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.67)</td>
<td>(0.77)</td>
<td>(1.50)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>TR&amp;R intervention</td>
<td>1.83</td>
<td>2.07</td>
<td>2.24</td>
<td>0.67</td>
<td>1.28</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>2.21</td>
<td>2.12</td>
<td>2.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.39)</td>
<td>(2.25)</td>
<td>(2.29)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.93)</td>
<td>(2.69)</td>
<td>(2.89)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V.3 Proportion of the TR&R intervention group aged over 40 years who were meeting a criterion of sufficient physical activity per week at baseline, 2 and 8-months

Over two thirds of the TR&R intervention and control group (70% and 66% respectively) participants were classified as participating in less than 150-minutes of physical activity a week at baseline (see Table V.5). Hence, there was no significant difference between the study groups at baseline (Yates Corrected $X^2$ (1, n = 382) = 0.48, $p = 0.49$; see Table V.5)
Table V.5: The number TR&R intervention group participating in at least 150-minutes of physical activity per week at baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>TR&amp;R intervention group</th>
<th>baseline</th>
<th>2-month n (%)</th>
<th>8-month n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 150-minutes</td>
<td>≤ 150-minutes</td>
<td>≤ 150-minutes</td>
</tr>
<tr>
<td>TR&amp;R intervention group</td>
<td>n = 138</td>
<td>22 (16)</td>
<td>22 (16)</td>
</tr>
<tr>
<td></td>
<td>&lt; 150-minutes</td>
<td>24 (17)</td>
<td>28 (20)</td>
</tr>
</tbody>
</table>

There were no statistically significant changes within either study group in relation to the proportion of participants reaching the 150-minute criterion by 2-months (TR&R intervention; McNemars $\chi^2 (1, n = 138) = 0.37, p = 0.54$). Hence, there was also no significant difference between groups (Yates Corrected $\chi^2 (1, n = 363) = 0.75, p = 0.39$).

Similar results were reported at the 8-month follow-up with no statistically significant difference observed within either study group (TR&R intervention group; McNemars $\chi^2 (1, n = 138) = 1.36, p = 0.24$) and no significant difference between groups (Yates Corrected $\chi^2 (1, n = 363) = 0.79, p = 0.37$).

V.4 Proportions expending adequate amounts of energy from physical activity at baseline, 2 and 8-months

At baseline the TR&R intervention and control groups reported similar proportions of participants in each energy expenditure category (see Table V.6). Particularly in terms of adequate and inadequate energy expenditure categories, where the TR&R intervention group reported fewer participants in the adequate category (21%) compared to the control group (28%), although the difference was not significant (Yates Corrected $\chi^2 (1, n = 363) = 2.05, p = 0.15$; see Table V.6).
Table V.6: Changes in energy expenditure categories in the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>Energy expenditure category</th>
<th>TR&amp;R intervention group n=138 n (%)</th>
<th>baseline</th>
<th>2-month</th>
<th>8-month</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td>8 (6)</td>
<td>10 (7)</td>
<td>15 (11)</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>20 (15)</td>
<td>27 (20)</td>
<td>28 (20)</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td>75 (54)</td>
<td>74 (54)</td>
<td>76 (55)</td>
</tr>
<tr>
<td>Sedentary</td>
<td></td>
<td>35 (25)</td>
<td>27 (20)</td>
<td>19 (14)</td>
</tr>
</tbody>
</table>

Similar results were reported at the 2-month follow-up where the TR&R intervention and control groups reported 27% and 29% of participants respectively were expending adequate amounts of energy from physical activity (Yates Corrected $X^2 (1, n = 363) = 0.01, p = 0.97$; see Table V.6). Further examination of the 2-month data (see Table V.7) showed that a non-significant number of TR&R intervention group participants who were classified as inadequately active at baseline became adequately active by 2-months (McNemars $X^2 (1, n = 138) = 1.42, p = 0.23$; see Section 10.8 for control group results).

Table V.7: Changes in adequate and inadequate energy expenditure categories in the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>baseline energy expenditure</th>
<th>adequate 2-month energy expenditure n = 138</th>
<th>inadequate 2-month energy expenditure n = 138</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
<td>27 (20)</td>
<td>83 (60)</td>
</tr>
<tr>
<td>adequate</td>
<td>10 (7)</td>
<td>18 (13)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8-month energy expenditure n = 138</th>
</tr>
</thead>
<tbody>
<tr>
<td>inadequate</td>
</tr>
<tr>
<td>adequate</td>
</tr>
</tbody>
</table>

By the 8-month follow-up the control group reported 33% of the participants were expending adequate amounts of energy from physical activity, whereas the TR&R intervention group reported only 31% (see Table V.7) but this difference was not significant (Yates Corrected $X^2 (1, n = 363) = 0.10, p = 0.75$; see Table V.6). Further examination of the 8-month energy expenditure change data showed a significant difference in the number of participants moving from inadequate to adequate activity
categories in both the TR&R intervention (McNemars $\chi^2 (1, n = 138) = 4.00$, $p = 0.05$; see Table V.7).

**V.5 Movement through the Stages of Change**

There were slightly more (76%) TR&R intervention group participants staged in the early stages (PC, C & P) compared to 69% in the control group at baseline (see Table V.8).

**Table V.8: Stage distribution within the TR&R intervention group at baseline and 8-months**

<table>
<thead>
<tr>
<th>Stage</th>
<th>TR&amp;R intervention group n=130 n (%)</th>
<th>8-months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td></td>
</tr>
<tr>
<td>Pre-contemplation</td>
<td>27 (21)</td>
<td>26 (20)</td>
</tr>
<tr>
<td>Contemplation</td>
<td>34 (26)</td>
<td>29 (22)</td>
</tr>
<tr>
<td>Preparation</td>
<td>38 (29)</td>
<td>33 (25)</td>
</tr>
<tr>
<td>Action</td>
<td>9 (7)</td>
<td>13 (10)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>17 (13)</td>
<td>26 (20)</td>
</tr>
<tr>
<td>Relapse</td>
<td>5 (4)</td>
<td>3 (2)</td>
</tr>
</tbody>
</table>

There was a 7% increase in M and 3% increase in A between baseline and 8-months in the TR&R intervention group. However, the control group reported a greater increase of 9% increase in M, most of which resulted from a decrease in the A stage (5%; see Table V.8 and Appendix T, Section T.6)

**V.5.1 Progression through the Stages of Change between baseline, 2 and 8-months**

Data from all participants followed up at 2-months were used in this analysis. There were no significant differences between the number of participants progressing at least one stage between the TR&R intervention and control groups between baseline and 2-months ($\chi^2 (1, n = 353) =0.05 p = 0.83$; OR = 1.08, 95%CI = 0.68-1.20).
Table V.9: A comparison between the TR&R intervention and control group participants who progressed at least one stage between baseline and 2-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group n=138*</td>
<td>57 (16)</td>
<td>81 (23)</td>
</tr>
<tr>
<td>control group n=215*</td>
<td>85 (24)</td>
<td>130 (37)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 8-months with participants in Relapse removed

Data from all participants followed up at 8-months were used in this analysis. There were no significant differences between the number of participants progressing at least one stage between the TR&R intervention and control groups between baseline and 8-months ($\chi^2 (1, n = 334) =0.05, p= 0.83; OR = 1.08, 95\%CI = 0.68-1.71$).

Table V.10: A comparison between the TR&R intervention and control group participants who progressed at least one stage between baseline and 8-months

<table>
<thead>
<tr>
<th></th>
<th>progressed n (%)</th>
<th>stable/relapsed n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group n=130*</td>
<td>61 (18)</td>
<td>69 (21)</td>
</tr>
<tr>
<td>control group n=204*</td>
<td>92 (28)</td>
<td>112 (34)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 8-months with participants in Relapse removed

V.5.2 Movement through the Stages of Change from the inactive stages to the active stages between baseline, 2 and 8-months

Of the 104 participants in the TR&R intervention group who were in P, C & P combined 24 had moved into the A & M group by 2-months, however, this was not statistically significant (McNemar's $\chi^2 (1, n = 131) = 0.88; p = 0.35$) compared to the 17 out of 27 participants moving from A & M to P, C & P (see Table V.11).
Table V.11: Movement from inactive to active stages of change within the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>TR&amp;R intervention group</th>
<th>Stage at baseline</th>
<th>Stage at 2-months (n)</th>
<th>Stage at 8-months (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PC, C &amp; P</td>
<td>A &amp; M</td>
<td>PC, C &amp; P</td>
</tr>
<tr>
<td>n = 131</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 (18)</td>
<td>80 (61)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 (8)</td>
<td>17 (13)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 8-months with participants in Relapse removed

Of the 97 participants in the TR&R intervention group who were in P, C & P combined 28 had moved into the A & M group by 8-months, however, this was not statistically significant ($\chi^2 (1, n = 122) = 2.75; p = 0.10$) compared to the 16 out of 25 participants moving from A & M to P, C & P (see Table V.11).

V.5.3 Movement through the Stages of Change from the sedentary stages to the active stages between baseline, 2 and 8-months

Of the 66 participants in the intervention group who were in PC & C combined 28 had moved into the P, A & M group by 2-months, however, this was not statistically significant ($\chi^2 (1, n = 131 = 0.00, p = 1.00$) compared to the 27 out of 65 participants moving from P, A & M to PC & C (see Table V.12).

Table V.12: Movement from sedentary to active stages of change within the TR&R intervention group between baseline, 2 and 8-months

<table>
<thead>
<tr>
<th>TR&amp;R intervention group n = 131</th>
<th>2-months n</th>
<th>8-months n</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>P, A &amp; M</td>
</tr>
<tr>
<td>TR&amp;R intervention group n = 131</td>
<td>PC &amp; C</td>
<td>28 (21)</td>
</tr>
<tr>
<td></td>
<td>P, A &amp; M</td>
<td>38 (29)</td>
</tr>
</tbody>
</table>

* all eligible participants followed-up at 2 and 8-months with participants in Relapse removed
Of the 59 participants in the intervention group who were in PC & C combined 24 had moved into the P, A & M group by 8-months, however, this was not statistically significant (McNemars $X^2 (1, n = 122) = 0.39; p = 0.53$) compared to the 29 out of 63 participants moving from P, A & M to PC & C (see Table V.12).

V.6 Changes in reported physical activity at 2-months adjusted to baseline level

Results presented in this section examine the number of participants in each study group who reported at least a 1 hour increase in their total physical activity between baseline and 2-months. Further examination of the data classified participants as either inadequately active or adequately active, based on energy expenditure or stage change between baseline and 2-months and the number of those participants who report the 1-hour increase in total physical activity.

V.6.1 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

A significant number of the inadequately active TR intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the adequately active intervention group participants (McNemars $X^2 (1, n = 138) = 3.75, p = 0.05$; see Table V.13). A non-significant result was observed in the control group (see Appendix T, Section T.7.1).

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>28 (20)</td>
<td>6 (4)</td>
<td>22 (16)</td>
</tr>
<tr>
<td>inadequate</td>
<td>110 (80)</td>
<td>38 (28)</td>
<td>72 (52)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by <1-hour or decreased by any amount.
However, there was no significant difference between the TR&R intervention and control groups inadequately active baseline sample who increased their total physical activity status by at least 1-hour between baseline and 2-months (OR = 0.98, 95% CI = 0.57-1.68; see Table V.14).

### Table V.14: A comparison between the number of inadequately active TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Group</th>
<th>Baseline n (%)</th>
<th>Physical activity increased by ≥ 1-hour n (%)</th>
<th>Other* n (%)</th>
<th>X^2 (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>110 (80)</td>
<td>38 (28)</td>
<td>72 (52)</td>
<td>0.00</td>
</tr>
<tr>
<td>Control group</td>
<td>163 (72)</td>
<td>57 (25)</td>
<td>106 (47)</td>
<td>(1.00)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the inadequately active participants at baseline. However, the model was not significant, hence all variables were removed from the model (Model Fit; \( X^2 = -4.50, \ p = 0.11 \) \(-2 \ log \ likelihood = 343.9\)). Therefore, there were no significant predictors of increasing physical activity by at least 1-hour between baseline and 2-months in the inadequately active baseline participants.

### V.6.2 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by inactive Stages of Change

A significant number of the inactive staged TR&R intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the active staged intervention group participants (McNemars \( X^2 \) (1 n = 133) = 52.2, \( p < 0.001 \); see Table V.16). A similar significant result was observed in the control group (see Appendix T, Section T.6.2).
Table V.15: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by inactive versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>28 (21)</td>
<td>6 (5)</td>
<td>22 (17)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>105 (79)</td>
<td>35 (26)</td>
<td>70 (53)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

There was no significant difference observed between the number of TR&R intervention and control group participants who were inactive by stage category at baseline who increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.88, 95% CI = 0.50-1.54; see Table V.16).

Table V.16: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>(X^2(p))</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>105 (79)</td>
<td>35 (26)</td>
<td>70 (53)</td>
<td>0.11</td>
</tr>
<tr>
<td>control group</td>
<td>152 (71)</td>
<td>55 (26)</td>
<td>97 (45)</td>
<td>0.74</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

As before, backward stepwise logistic regression was conducted to determine if there were any significant predictors increasing total physical activity by at least 1-hour between baseline and 2-months in the inactive staged participants at baseline. The model retained gender and baseline activity level (Model Fit; \(X^2 = 3.58\), \(p = 0.06\) (-2 log likelihood = 211.9) but not all aspects of the variables were significant. The only significant predictor of increasing total physical activity by at least 1-hour baseline and 2-months in the inactive staged participants at baseline was baseline activity level <15-minutes (OR = 2.04, 95% CI = 1.05-4.00) compared to baseline activity ≥70-minutes per week. The other variables (gender and baseline activity level ≥15 to 70-minutes per week) were not independently significant predictors of change (see Table V.17).
Table V.17: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>baseline activity (&lt;15 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min/wk)</td>
<td>-0.47</td>
<td>0.33</td>
<td>0.15</td>
<td>0.63 (0.33-1.19)</td>
</tr>
<tr>
<td>baseline activity (≥ 70 min/wk)</td>
<td>-0.72</td>
<td>0.34</td>
<td>0.03</td>
<td>0.49 (0.25-0.95)</td>
</tr>
<tr>
<td>gender (female)</td>
<td>-0.49</td>
<td>0.30</td>
<td>0.10</td>
<td>0.61 (0.34-1.10)</td>
</tr>
<tr>
<td>gender (male)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation ($p = 0.5$); baseline intention ($p = 0.1$); education ($p = 0.7$); language ($p = 0.5$); age ($p = 0.5$); employment status ($p = 0.5$); child at home ($p = 0.1$); BMI ($p = 0.9$);

V.6.3 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 2-months categorised by sedentary Stages of Change

A significant number of the sedentary staged TR&R intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the active staged intervention group participants (McNemars $X^2 (1 n = 133) = 8.60, \ p < 0.01$; see Table V.18).

A similar significant result was observed in the control group (see Appendix T, Section T.6.3).

Table V.18: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by sedentary versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>67 (50)</td>
<td>21 (16)</td>
<td>46 (35)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>66 (50)</td>
<td>20 (15)</td>
<td>46 (35)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

There was no significant difference observed between the number of TR&R intervention and control group participants who were sedentary by stage category
at baseline and increased their total physical activity by at least 1-hour between baseline and 2-months (OR = 0.84, 95%CI = 0.41-1.74; see Table V.19).

Table V.19: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 2-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>66 (50)</td>
<td>20 (15)</td>
<td>46 (35)</td>
<td>0.11</td>
</tr>
<tr>
<td>control group</td>
<td>97 (45)</td>
<td>33 (15)</td>
<td>64 (30)</td>
<td>0.74</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

As before, backward stepwise logistic regression was conducted to determine if there were any significant predictors increasing total physical activity by at least 1-hour between baseline and 2-months in the sedentary staged participants at baseline. The model retained gender and baseline intention and baseline activity level (Model Fit; $X^2 = 11.27, p = 0.01$ (-2 log likelihood = 188.3) but not all aspects of the variables were significant (see Table V.20).

Table V.20: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 2-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (male)</td>
<td>-0.76</td>
<td>0.40</td>
<td>0.06</td>
<td>0.47 (0.21-1.02)</td>
</tr>
<tr>
<td>gender (female)</td>
<td>0.63</td>
<td>0.37</td>
<td>0.08</td>
<td>1.87 (0.91-3.88)</td>
</tr>
<tr>
<td>baseline intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline intention (next month)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (0 min/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥0 to 60 min/wk)</td>
<td>1.08</td>
<td>0.54</td>
<td>0.04</td>
<td>2.95 (1.02-8.49)</td>
</tr>
<tr>
<td>baseline activity (≥ 60 min/wk)</td>
<td>0.51</td>
<td>0.52</td>
<td>0.33</td>
<td>1.66 (0.60-4.61)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: group allocation ($p = 0.3$); education ($p = 0.7$); marital status ($p = 0.9$); language ($p = 0.3$); age ($p = 0.8$); employment status ($p = 0.9$); child at home ($p = 0.3$); BMI ($p = 0.8$).

The only significant predictor of increasing total physical activity by at least 1-hour baseline and 2-months in the sedentary staged participants at baseline was
baseline activity level >0 to 60-minutes per week (OR = 2.04, 95% CI = 1.05-4.00) compared to baseline activity 0-minutes per week. The other variables (Gender, baseline Intention and baseline activity level ≥60-minutes per week) were not independently significant predictors of change (see Table V.20).

V.7 Changes in reported physical activity at 8-months adjusted to baseline level

Results presented in this section examine the number of participants in each study group who reported at least a 1 hour increase in their total physical activity between baseline and 8-months. Further examination of the data classifies participants as either inadequately active or adequately active, based on energy expenditure or stage change between baseline and 8-months and the number of those participants who report the 1-hour increase in total physical activity.

V.7.1 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure

A significant number of the inadequately active TR&R intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 2-months compared the adequately active intervention group participants (McNemars $X^2 (1 \ n = 138) = 8.01, p < 0.01$; see Table V.21). A significant result was also observed in the control group (see Appendix T, Section T.8.1).

Table V.21: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 2-months categorised by energy expenditure

<table>
<thead>
<tr>
<th>Energy expenditure</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>adequate</td>
<td>28 (20)</td>
<td>2 (1)</td>
<td>26 (19)</td>
</tr>
<tr>
<td>inadequate</td>
<td>110 (80)</td>
<td>52 (38)</td>
<td>58 (42)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

# Fishers exact test.
There was a significant difference between the TR&R intervention and control groups sedentary by stage category at baseline who increased their total physical activity status by at least 1-hour between baseline and 8-months (OR = 1.46, 95% CI = 0.87-2.46; see Table V.22).

**Table V.22: A comparison between the number of inadequately active TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by energy expenditure**

<table>
<thead>
<tr>
<th>Group</th>
<th>Baseline n (%)</th>
<th>Physical activity increased by ≥ 1-hour n (%)</th>
<th>Other* n (%)</th>
<th>X² (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group*</td>
<td>110 (80)</td>
<td>52 (38)</td>
<td>58 (42)</td>
<td>1.94</td>
</tr>
<tr>
<td>Control group*</td>
<td>172 (75)</td>
<td>62 (28)</td>
<td>101 (45)</td>
<td>(0.16)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the inadequately active participants at baseline (Model Fit; $X^2 = 21.19, p < 0.001$ (-2 log likelihood = 336.0)). The model retained group allocation, language spoken at home, baseline intention and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inadequately active participants at baseline were; i. baseline activity level <15-minutes (OR = 3.33, 95% CI = 1.69-6.67) compared to baseline activity ≥70-minutes per week and ii. baseline intention to be more active in the next month (OR = 2.09, 95% CI = 1.12-3.92). The other variables (group allocation, language spoken at home baseline activity level ≥15 to 70-minutes per week and baseline intention to be more active within 6-months) were not independently significant predictors of change (see Table V.23).
Table V.23: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inadequately active participants as categorised by energy expenditure category

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.45</td>
<td>0.27</td>
<td>0.09</td>
<td>1.57 (0.92-2.66)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (English)</td>
<td>1.73</td>
<td>1.09</td>
<td>0.11</td>
<td>5.66 (0.67-47.77)</td>
</tr>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.74</td>
<td>0.32</td>
<td>0.02</td>
<td>2.09 (1.12-3.93)</td>
</tr>
<tr>
<td>intention (6-months)</td>
<td>0.38</td>
<td>0.32</td>
<td>0.13</td>
<td>1.63 (0.85-3.12)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min /wk)</td>
<td>-0.48</td>
<td>0.31</td>
<td>0.12</td>
<td>0.62 (0.34-1.14)</td>
</tr>
<tr>
<td>baseline activity (≥70 min /wk)</td>
<td>-1.20</td>
<td>0.34</td>
<td>0.00</td>
<td>0.30 (0.15-0.59)</td>
</tr>
</tbody>
</table>

* Variables excluded from the model: gender (p = 0.5); education (p = 0.2); employment status (p = 0.7); child at home (p = 0.5); BMI (p = 0.5); marital status (p = 0.5).

V.7.2 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by inactive Stages of Change

A significant number of the inactive staged TR&R intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared to the active staged intervention group participants (McNemars $X^2$ (1 n = 133) = 47.44, p < 0.001; see Table V.24). A similar significant result was observed in the control group (see Appendix T, Section T.8.2).

Table V.24: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by inactive versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; M (active)</td>
<td>28 (21)</td>
<td>2 (2)</td>
<td>26 (20)</td>
</tr>
<tr>
<td>PC, C &amp; P (inactive)</td>
<td>105(79)</td>
<td>50 (38)</td>
<td>55 (41)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.
There was no significant difference observed between the number of TR&R intervention and control group participants who were inactive by stage category at baseline who increased their total physical activity by at least 1-hour between baseline and 8-months (OR = 1.43, 95% CI = 0.84-2.45; see Table V.25).

Table V.25: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>105 (79)</td>
<td>50 (38)</td>
<td>55 (41)</td>
<td>1.63</td>
</tr>
<tr>
<td>control group</td>
<td>152 (71)</td>
<td>29 (28)</td>
<td>93 (44)</td>
<td>0.20</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount.

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the inactive staged participants at baseline (Model Fit; $X^2 = 22.09$, $p < 0.001$ (-2 log likelihood = 321.5)). The model retained group allocation, language spoken at home, baseline intention and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. baseline activity level < 15-minutes (OR = 2.70, 95% CI = 1.39-5.26) compared to baseline activity ≥ 70-minutes per week and ii. baseline intention to be more active in the next month (OR = 2.11, 95% CI = 1.09-4.12). The other variables (group allocation, language spoken at home baseline activity level ≥ 15 to 70-minutes per week and baseline intention to be more active within 6-months) were not independently significant predictors of change (see Table V.26).
Table V.26: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive participants as categorised by inactive Stages of Change

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>group allocation (control)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>group allocation (TR intervention)</td>
<td>0.47</td>
<td>0.27</td>
<td>0.08</td>
<td>1.60 (0.94-2.72)</td>
</tr>
<tr>
<td>language (non-English)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>language (English)</td>
<td>1.74</td>
<td>1.09</td>
<td>0.11</td>
<td>5.70 (0.67-48.25)</td>
</tr>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>intention (next month)</td>
<td>0.75</td>
<td>0.34</td>
<td>0.03</td>
<td>2.11 (1.09-4.12)</td>
</tr>
<tr>
<td>intention (6-months)</td>
<td>0.54</td>
<td>0.35</td>
<td>0.12</td>
<td>1.71 (0.86-3.37)</td>
</tr>
<tr>
<td>baseline activity (&lt;15 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>baseline activity (≥15 to 70 min /wk)</td>
<td>-0.42</td>
<td>0.32</td>
<td>0.19</td>
<td>0.65 (0.86-1.23)</td>
</tr>
<tr>
<td>baseline activity (≥ 70 min /wk)</td>
<td>-0.99</td>
<td>0.34</td>
<td>0.00</td>
<td>0.37 (0.19-0.72)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender (p = 0.5); education (p = 0.1); age (p = 0.5); employment status (p = 0.8); child at home (p = 0.7); BMI (p = 0.4); marital status (p = 0.6).

V.7.3 A comparison between the TR&R intervention and control group participants who reported at least a 1-hour increase in total physical activity between baseline and 8-months categorised by sedentary Stages of Change

A non-significant number of the sedentary staged TR&R intervention group participants at baseline increased their total physical activity level by at least 1-hour between baseline and 8-months compared the active staged intervention group participants (McNemars X² (1 n = 133) = 2.82, p = 0.09; see Table V.27).

A similar non-significant result was observed in the control group (see Appendix T, Section T.8.3).

Table V.27: Proportion of the TR&R intervention group who increased their total physical activity by at least 1-hour between baseline and 8-months categorised by sedentary versus active Stages of Change

<table>
<thead>
<tr>
<th>Stage category</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P, A &amp; M (active)</td>
<td>67 (50)</td>
<td>23 (17)</td>
<td>44 (33)</td>
</tr>
<tr>
<td>PC &amp; C (sedentary)</td>
<td>66 (50)</td>
<td>29 (22)</td>
<td>37 (28)</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount
Appendix V

There was no significant difference observed between the number of TR&R intervention and control group participants who were inadequately active at baseline (by alternate stage category) and increased their total physical activity by at least 1-hour at 8-months (OR = 1.45, 95%CI = 0.73-2.90; see Table V.28).

Table V.28: A comparison between the number of inactive TR&R intervention and control group participants who increased their total physical activity prevalence by at least 1-hour between baseline and 8-months categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>group</th>
<th>baseline n (%)</th>
<th>physical activity increased by ≥ 1-hour n (%)</th>
<th>other* n (%)</th>
<th>X² (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR&amp;R intervention group</td>
<td>66 (50)</td>
<td>29 (22)</td>
<td>37 (28)</td>
<td>0.96</td>
</tr>
<tr>
<td>control group</td>
<td>97 (45)</td>
<td>34 (16)</td>
<td>63 (29)</td>
<td>0.33</td>
</tr>
</tbody>
</table>

* other = those participants whose reported physical activity increased by < 1-hour or decreased by any amount

Backward stepwise logistic regression was conducted on the data to determine any significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months (Model Fit; $X^2 = 18.58$, $p < 0.001$ (-2 log likelihood = 194.1)). The model retained Age, education level, baseline Intention and baseline activity status but not all were individually significantly predictors. The significant predictors of increasing total physical activity by at least 1-hour baseline and 8-months in the inactive staged participants at baseline were; i. ≥10-years education (OR = 3.10, 95% CI = 1.50-6.39), and ii. baseline intention to be more active in the next month (OR = 2.11, 95% CI = 1.05-4.29). The other variables (age and baseline activity level) were not independently significant predictors of change (see Table V.29).
Table V.29: Significant predictors of increasing total physical activity by at least 1-hour between baseline and 8-months in the previously inactive participants as categorised by sedentary Stages of Change

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>age (&lt;50-years)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age (≥50-years)</td>
<td>0.69</td>
<td>0.39</td>
<td>0.08</td>
<td>2.00 (0.93-4.28)</td>
</tr>
<tr>
<td>education (&lt;10-years)</td>
<td>1.13</td>
<td>0.37</td>
<td>0.18</td>
<td>3.10 (1.50-6.39)</td>
</tr>
<tr>
<td>education (≥ 10-years)</td>
<td>0.75</td>
<td>0.36</td>
<td>0.04</td>
<td>2.11 (1.05-4.29)</td>
</tr>
<tr>
<td>intention (none)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>intention (next month)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (0 mins/wk)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>baseline activity (&gt;0 to 60 min /wk)</td>
<td>0.79</td>
<td>0.50</td>
<td>0.05</td>
<td>2.21 (0.83-5.87)</td>
</tr>
<tr>
<td>baseline activity (≥ 60 min /wk)</td>
<td>-0.01</td>
<td>0.48</td>
<td>0.00</td>
<td>0.99 (0.39-2.54)</td>
</tr>
</tbody>
</table>

Variables excluded from the model: gender (p = 0.9); marital status (p = 0.6); language (p = 0.2); employment status (p = 0.9); child at home (p = 0.7); BMI (p = 0.3); group allocation (p = 0.1).

V.8 Maintenance of behaviour change between 2 and 8-months between the TR&R intervention and control groups

The results presented in this Section are focused on those participants aged over 40 in the TR&R intervention and control groups who increased their total baseline physical activity level by at least 1-hour at 2-months and then maintained that increase at 8-months. Out of the 138 intervention and 225 control group participants followed-up at 8-months, 24 intervention and 29 control participants who had maintained the initial 1-hour increase they reported at 2-months at the 8-month follow-up, however, the difference in proportions was not significant between groups ($X^2 (1, n = 363) = 1.1, p = 0.31$).