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# A randomised controlled trial of a nutrition and physical activity intervention for patients with depression and/or anxiety in primary care

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*University of Wollongong*

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**A RANDOMISED CONTROLLED TRIAL OF A NUTRITION AND PHYSICAL ACTIVITY  
INTERVENTION FOR PATIENTS WITH DEPRESSION AND/OR ANXIETY IN PRIMARY CARE**

A thesis submitted in fulfillment of the requirements  
for the award of the degree

**Doctor of Philosophy**

from  
University of Wollongong

by  
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**School of Health Sciences**  
**2013**

## **DECLARATION**

I hereby declare that this thesis, submitted in fulfillment of the requirements for the award of Doctor of Philosophy, in the School of Health Sciences, University of Wollongong, is my own work unless otherwise referenced or acknowledged. This document has not been submitted in whole, or in part, for qualifications at any other academic institution.

Adrienne K Forsyth

21<sup>st</sup> February 2013

## DEDICATION

To Annabelle and Xavier

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## LIST OF ABBREVIATIONS

AIMhi	Australian Integrated Mental Health Initiative
AUDIT	Alcohol Use Disorders Identification Test
AusDiab	Australian Diabetes Obesity and Lifestyle Study
Aus-HEI	Australian modified Healthy Eating Index
BMI	Body mass index
BMR	Basal metabolic rate
BSL	Blood sugar level
CABG	Coronary artery bypass graft
CCF	Congestive cardiac failure
CI	Confidence interval
DASS	Depression, Anxiety and Stress Scale
DEP	Dietitian and Exercise Physiologist
df	Degrees of freedom
EAR	Estimated Average Requirement
FeSO	Iron sulphate
g	Gram
GP	General practitioner
GPME	General practice medical educator
HEI	Healthy Eating Index
HPA	Hypothalamic-pituitary-adrenal axis
IDGP	Illawarra Division of General Practice
kcal	Kilocalorie
kg	Kilogram
M	Mean
MET	Metabolic equivalent
mg	Milligram
mmHg	Millimetres of mercury
n	Number



n-3 PUFA	Omega-3 polyunsaturated fatty acid
NNS	National Nutrition Survey
NSW	New South Wales
p	P value
PA	Physical activity
PN	Practice nurse
QLD	Queensland
r	Correlation coefficient
RAS	Recovery Assessment Scale
RDI	Recommended Dietary Intake
SD	Standard deviation
t	T statistic
TIA	Transient ischemic attack
µg	Microgram
UL	Upper Limit

## PUBLICATIONS

### Peer reviewed publications in support of this thesis

Forsyth, A., Williams, P. and Deane, F. (2012). Nutrition status of primary care patients with depression and anxiety. *Australian Journal of Primary Health*, 18(2), 172-176.

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Forsyth, A., Williams, P., Deane, F. and Curtis, O. (2007). A model of care for diet and exercise counselling for patients with depression and/or anxiety in primary care, poster presentation. 25<sup>th</sup> National Conference of the Dietitians Association of Australia, DAA, Hobart. *Nutrition and Dietetics*, 64(Suppl 1): S16.

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2<sup>nd</sup> National Conference of the Australian Association for Exercise and Sports Science.

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## ABSTRACT

Depression, anxiety and substance abuse are the leading diagnoses of mental illness in Australia, and are most commonly treated with medication and psychological intervention. The Physical Activity Guidelines Advisory suggested that physical activity could protect against symptoms of anxiety and depression, and against the development of an anxiety or depressive disorder. Several nutrients including omega 3 fatty acids, folate, vitamin B12, vitamin B6, zinc, iron, selenium and antioxidants (vitamins C and E) have also been linked to mental health. Despite the growing interest in lifestyle management of mental illness, there has been a dearth of naturalistic studies evaluating interventions in 'normal practice' rather than highly supervised clinical trials.

This randomised controlled trial evaluates a lifestyle intervention that was designed to fit within the Australian Enhanced Primary Care Scheme which provides rebates for up to five annual visits to allied health professionals including dietitians and exercise physiologists. GPs in the Illawarra region of New South Wales were invited to refer adult patients currently being treated for depression and/or anxiety. Patients were randomised into either an intervention or attention control group. The intervention consisted of a series of six visits (including assessments) to a dual qualified dietitian/exercise physiologist (DEP) over a 12-week period. DEPs utilised motivational interviewing and activity scheduling to engage patients in individually-tailored lifestyle change.

From 2006 to 2008, 142 patients between the ages of 18 and 84 years were referred to participate. A total of 32 men and 77 women completed an initial assessment. On average, participants were overweight or obese (mean BMI 31.1 kg m<sup>-2</sup>, mean waist circumference 104.6 cm for males and 92.6 cm for females). Patients reported mild to moderate symptoms of depression, anxiety and stress. Nutrient intakes were similar to those of the general Australian population, however only 17% of participants met the Estimated Average Requirement (EAR) for folate, 57% met the EAR for calcium, and 78% met the EAR for

magnesium. Magnesium intake was significantly negatively correlated with reported symptoms of depression. Australian modified Healthy Eating Index (Aus-HEI) scores for diet quality were significantly negatively correlated with Depression Anxiety and Stress Scale (DASS-21) scores. Fifty-three percent of participants demonstrated below average fitness. The National Physical Activity Guidelines were met by 50.5% of participants, but only 18% of participants met the recommendations for vigorous physical activity. Men were significantly more active than women. Total time spent in physical activity, and time spent in vigorous physical activity, were found to be significantly inversely related to depression and total DASS scores. Participants were most likely to choose a combination of both physical activity and dietary goals (n=55), followed by physical activity goals only (n=20). Walking was the most popular physical activity goal (n=69). There was significant improvement over time in DASS scores for the treatment group, but this was not significantly greater than improvements achieved by the control group. Improvements in the control group may have occurred in response to other treatments such as medication or counselling. Both the treatment and control groups improved their participation in physical activity, fitness levels and diet quality over the course of the study period. Intake of iron and folate declined in the control group and improved in the treatment group. Results suggest that patients may be able to initiate lifestyle change with simple activities such as walking or reducing portion sizes, but require professional assistance with more complex dietary modification. Positive feedback was received from both GPs and patients, suggesting that the proposed model of care would be suitable in a primary care environment.



## CHAPTER 1 INTRODUCTION AND REVIEW OF LITERATURE

### 1.1 Mental health care in Australia

Mental illness is experienced by 18% of Australian adults in any given year (Department of Health and Ageing, 2007). This represents 24% of the non-fatal disease burden in Australia (Begg et al., 2007). Depression, anxiety and substance abuse are the leading diagnoses of mental illness in Australia (Korten & Henderson, 2000), and are most commonly treated with medication and psychological interventions (Ellis et al., 2004).

Of those Australians with common mental disorders, 64.6% had no contact with health services in the past year, and only 29.4% saw GPs and 7.5% saw psychiatrists (Henderson et al., 2000). Over half of Australians with depression or anxiety did not seek a consultation for a mental health problem (Andrews & Carter, 2001), and 48% of Australians over the age of 70 did not report moderate or severe depressive episodes they were experiencing to their GP (O'Connor et al., 2001). GPs did not recognize existing mental disorders in 56% of patients (Hickie et al., 2001), with barriers in identifying depression including personal and professional doctor barriers, consultation barriers, and real and perceived patient barriers (Pitman et al., 1997).

This study was undertaken in the Illawarra region of NSW, Australia. A local study found that thirty percent of patients present in general practice with mental illness (Marshall & Deane, 2004). GPs in the Illawarra treated 29% of patients for depression, 25% of patients for anxiety and 9% of patients for substance misuse (Marshall & Deane, 2004). Common modalities of treatment included pharmacotherapy (12-77%) and psychotherapy (58-76%). Treatment for physical health was provided to just 33-39% of patients with mental illness (Marshall & Deane, 2004).

Given the high rates of mental disorder, poor identification, and low rates of treatment, there is a need to consider alternative treatments. This may be

particularly important for patients who are reluctant to participate in traditional treatment modalities such as taking medication or expressing their feelings in psychotherapy. They may be attracted to other potentially effective interventions such as diet and exercise. There is growing interest and evidence to support diet and exercise interventions in the treatment of mental illness including depression and anxiety (Martinsen & Raglin, 2007), but little is known about the optimal method of delivery of these services.

## **1.2 Diet and mental health: translating recent findings into practice recommendations**

Mental health is a topic of increasing interest for Australian dietitians. With such a large proportion of the population experiencing chronic or recurrent mental illness (DOHA, 2007), it is likely that many clients of dietitians will present with mental illness. In fact, mental illness is commonly associated with other chronic diseases including diabetes, metabolic syndrome, cardiovascular disease and cancer (Balon 2006). Depression and anxiety are the most common diagnoses of mental illness in the Australian adult population (Korten & Henderson 2000), and for many people may be undetected or poorly managed. Dietitians are in a unique position to provide individual dietary advice which may impact on the mental health of clients in respect to both prevention and treatment.

Australian dietitians have access to many resources for managing clients with mental illness available through the Dietitians Association of Australia (<http://daa.asn.au/members/diner/>), and Dietitians of Canada have also developed guidelines for promoting mental health through healthy eating and nutritional care (Davison et al., 2012). The present chapter aims to outline the current evidence surrounding nutrition status, nutrient intake and dietary patterns of adults with depression and anxiety, to explore published accounts of nutrition interventions, and to provide succinct recommendations for providing nutrition advice to patients with depression and/or anxiety.

A search was conducted using Medline, PubMed, Web of Science and Cochrane Library for review articles with keywords diet, nutrition, depression or anxiety. English language reviews published up to 2010 were included. Additional references cited in these articles were also used. Findings were summarised and are described below.

### 1.2.1 Nutrition status of people with depression and anxiety

Many nutrients have known impacts on brain function (refer to Kaplan et al., 2007 for a detailed description of these functions). With the exception of omega-3 fatty acids and folate, there has been very little published evaluating blood nutrient levels of people with depression or anxiety. It has been suggested that there are too few controlled trials on this topic to warrant a meta-analysis (Kaplan et al., 2007). Studies that have been published often have had small numbers of participants or were limited to specific groups, making it difficult to be able to generalise findings. No notable studies demonstrating links between nutrient status and anxiety could be found.

#### 1.2.1.1 *Fatty acids*

Omega-3 fatty acids (n-3 PUFAs) are the most widely studied nutrients to date with respect to their relationship with mental illness. Serum or red blood cell concentrations of n-3 PUFAs have been repeatedly demonstrated to be lower in individuals with depression and a strong correlation has been found between n-3 PUFA levels and severity of depression (Adams et al. 1996; Edwards et al. 1998; Maes et al. 1996; Maes et al. 1999; Owen et al., 2008; Peet et al. 1998; Ross, 2007; Tiemeier et al. 2003; Su, 2008). For example, Edwards (1998) found mean total red blood cell membrane n-3 PUFA levels to be 5.39 mg/ 100 mg phospholipid in depressed patients compared to 7.60 in controls ( $p = 0.02$ ). Total n-3 PUFA levels were also significantly inversely correlated with depression scores ( $r = -0.75$ ,  $P = 0.02$ ).

### 1.2.1.2 *Vitamins*

Borderline low values of serum and red blood cell folate have been observed in adults with depression (Carney et al., 1990; Fava et al. 1997), with an inverse relationship between folate levels and severity of depression identified in some studies (Alpert et al. 2000; Carney et al., 1990; Wesson et al., 1994). In several studies, serum and red blood cell folate levels have been demonstrated to be lower in those with a diagnosis of major depression (Alpert et al. 2000; Bjelland et al., 2003; Morris et al. 2003; Rosche et al., 2003). Folate deficiency has been associated with depression in the elderly (Benton & Donohoe 1999), but was later found to have no obvious association with depression, anxiety, quality of life or cognition in elderly women (Cassidy et al. 2004).

Contrary to one earlier study (Fava et al. 1997), several studies have found lower levels of vitamin B12 in patients with depression (Baldewicz et al. 2000; Bjelland et al., 2003; Pennix et al., 2000; Tiemeier et al. 2002). Tiemeier et al. (2002) found that the severity of depression was related to serum vitamin B12 levels, with depressive disorders nearly 70% more likely among participants with vitamin B12 deficiency (OR = 1.69, 95% CI: 1.10-2.56,  $p = 0.02$ ). Low levels of vitamin B6 have also been found in some patients with depression (Carney et al., 1982; Stewart et al., 1984).

In an American national survey, young adults aged 15-39 years with vitamin D deficiency were found to have a higher likelihood of having a current depressive episode than those with vitamin D sufficiency (OR = 2.01, 95% CI: 1.25-3.24,  $p < 0.001$ ) (Ganji et al., 2010).

Two studies have found lower levels of serum vitamin E in patients with major depressive disorder than healthy controls, as well as a positive correlation between serum vitamin E levels and duration of major depressive disorder (Maes et al. 2000; Shibata et al. 1999). Tiemeier et al. (2002) found no correlation between vitamin E levels and subsequent depressive symptoms.

### 1.2.1.3 Minerals

Lower iron and hemoglobin levels have been found in adults with major depression relative to controls (Maes et al., 1996). Iron deficiency has been associated with the level of depression in young women (Rangan et al., 1998). Shariatpanaahi et al. (2007) also found an association between low ferritin levels and depression in female medical students. The odds of depression were increased by 1.92 for women with iron deficiency (serum ferritin levels of 15 ng/L or less) compared to women with serum ferritin levels over 15 ng/L.

Several studies have found serum and plasma zinc levels to be lower in patients with depression than in healthy controls (Hansen et al., 1983; Maes et al., 1997; McLoughlin & Hodge, 1990; Siweck et al., 2010), for example zinc levels were 22% lower for depressed patients versus healthy volunteers in the Siweck study, and correlated with severity of depression (Maes et al., 1997). Patients with major depression have been found to have significantly lower red blood cell calcium concentration than controls (Kamei et al., 1998). Finally, in a small study, low magnesium levels were found in 10 inpatients with depression in comparison with healthy controls (Kirov & Tsachev, 1990).

The nutrition status of patients described in the studies reported here are associations only. They do not necessarily show cause: either poor nutrient status leading to depression or depression leading to poor nutrient status. It is also unclear from this data whether low nutrient status is related to dietary intake. Section 2.1.3 will present data demonstrating nutrient intakes of people with depression and anxiety.

### 1.2.2 Body mass of people with depression and anxiety

Weight management may also be an issue for people with depression and/or anxiety. A 2010 systematic review and meta-analysis (Luppino et al., 2010) found a reciprocal link between depression and obesity, where obesity increases the risk of depression, and depression is also predictive of developing obesity. An association

has also been found between depression and binge eating disorder (Araujo et al., 2010), which may contribute to the development of obesity. However, the causal link between obesity and depression is more prevalent in America (Luppino et al., 2010) and was not identified in an Australian study (Jorm et al., 2003). In any case, in daily practice both being underweight or overweight can be easily identified by dietitians with anthropometric measurements at an initial assessment and managed as indicated using the *Best Practice Guidelines for the Treatment of Overweight and Obesity in Adults* (Dietitians Association of Australia, 2012) or the guidelines for the management of malnutrition (Dietitians Association of Australia, 2009).

### 1.2.3 Nutrient intakes of people with depression and anxiety

There is a large body of evidence linking nutrition and brain function, including mood, that has been established over the past century (Leung & Kaplan, 2009). Murakami and Sasaki (2010) recently published the first systematic review of observational studies on diet and depressive symptoms. Most of the studies demonstrated a lack of association between dietary variables and depressive symptoms. Energy, macronutrient and micronutrient intake were evaluated in some of the 34 articles on dietary intake and depressive symptoms. Almost all studies showed no association, with the exception of folate in men for which a significant inverse relationship between folate intake and depression was found in four of seven articles. Other studies that were reviewed investigated whole food consumption, and of these all showed no association, except for fish. Seven of 16 articles demonstrated a significant inverse relationship between depressive symptoms and fish consumption.

Table 1-1 outlines the evidence both for and against associations between nutrient intake and depression.

None of the studies have reported any positive (ie adverse) association between nutrient intakes and depressive symptoms. In studies evaluating intake of multiple nutrients, most nutrients including calcium, iron, vitamin D, thiamine, niacin, vitamin

C and iodine were not associated with depression (Fulkerson et al. 2004; Woo et al. 2006), but several studies report beneficial effects of higher intakes of PUFAs and folate.

#### 1.2.4 Dietary habits of people with depression and anxiety

##### *1.2.4.1 Whole food intake*

Intakes of some whole foods have also been studied to evaluate any links with depression. These foods are outlined in Table 1-2.

**Table 1-1 Nutrient intakes associated with depression**

Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Nutrient	Finding (+) positive association (0) no significant association (-) inverse association
Appleton et al., 2007	UK	Cross-sectional	Neutral	2982 adult men and women	Food frequency questionnaire	n-3 PUFA	0
Astorg et al., 2008b	France	Prospective cohort	Positive	1864 adult men and women aged 35-60 years	24-hour dietary records	Folate	-
						n-3 PUFA	0
Bots et al., 2008	Finland, Italy, Netherlands	Prospective cohort	Neutral	526 men aged 70-89 years	Diet history interview	Energy	0
						Total fat	0
						Saturated fat	0
						Polyunsaturated fat	0
						Cholesterol	0
Edwards et al., 1998	UK	Case-control	Positive	24 adult men and women	7-day weighed intake	n-3 PUFA	-



Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Nutrient	Finding (+) positive association (0) no significant association (-) inverse association
Fulkerson et al., 2004	USA	Cross-sectional	Positive	4734 adolescent girls and boys	Food frequency questionnaire	Energy	0
						Total fat	0
						Vitamin B6	0
						Folate	0
						Vitamin B12	0
Hakkarainen et al., 2004	Finland	Prospective cohort	Neutral	27 111 men aged 50-69 years	Diet history questionnaire	n-3 PUFA	0
Hawkes and Hornbostel, 1996	USA	Prospective cohort	Neutral	11 adult men	Controlled diet in metabolic unit	Selenium	-
Jacka et al., 2009	Norway	Cross-sectional	Positive	5708 adult men and women	Food frequency questionnaire	Magnesium	-
Jacka et al., 2004	Australia	Prospective cohort	Neutral	755 women aged 23-97 years	Food frequency questionnaire	n-3 PUFA	0
Kamphuis et al.,	Netherlands	Cross-	Positive	332 men aged 70-	Food frequency	Vitamin B6	0

Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Nutrient	Finding (+) positive association (0) no significant association (-) inverse association
2008		sectional		90 years	questionnaire		
						Folate	0
						Vitamin B12	0
						n-3 PUFA	-
Merete et al., 2008	USA	Cross-sectional	Positive	869 older adult men and women	Food frequency questionnaire	Vitamin B6	-
Miyake et al., 2006	Japan	Prospective cohort	Positive	865 pregnant women	Diet history questionnaire	Saturated fat	0
						Monounsaturated fat	0
						Cholesterol	0
						Arachidonic acid	0
						Riboflavin	0
						Vitamin B6	0
						Folate	0



Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Nutrient	Finding (+) positive association (0) no significant association (-) inverse association
						Vitamin B12	0
						n-3 PUFA	0
Sontrop et al., 2008	Canada	Cross-sectional	Positive	2061 pregnant women	Food frequency questionnaire	n-3 PUFA	0
Suzuki et al., 2004	Japan	Cross-sectional	Positive	771 newly diagnosed lung cancer patients	Food frequency questionnaire	n-3 PUFA	-
Tolmunen et al., 2004	Finland	Prospective cohort	Positive	2313 men aged 42-60 years	4-day dietary records	Folate	-
						Vitamin B12	0
						n-3 PUFA	0
Tolmunen et al., 2003	Finland	Cross-sectional	Positive	2443 men aged 42-60 years	4-day dietary records	Riboflavin	0
						Vitamin B6	0
						Folate	-

Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Nutrient	Finding (+) positive association (0) no significant association (-) inverse association
Woo et al., 2006	China	Cross-sectional	Positive	3313 adults over age 65 years	Food frequency questionnaire	Vitamin B12	0
						Carbohydrate	0
						Fibre	-
						Total fat	0
						Saturated fat	0
						Monounsaturated fat	0
						Polyunsaturated fat	0
						Cholesterol	0
						Vitamin A	-
						Riboflavin	-

\*Based on the Quality Criteria Checklist of the Evidence Analysis Manual (Academy of Nutrition and Dietetics, 2012)

## Summary

<b>Nutrient</b>	<b>-</b>	<b>0</b>	<b>+</b>
Energy	0	2	0
Carbohydrate	0	1	0
Fibre	1	0	0
Total fat	0	3	0
Saturated fat	0	3	0
Monounsaturated fat	0	2	0
Polyunsaturated fat	0	2	0
n-3 PUFA	3	9	0
Arachadonic acid	0	1	0
Cholesterol	0	3	0

<b>Nutrient</b>	<b>-</b>	<b>0</b>	<b>+</b>
Vitamin A	1	0	0
Riboflavin	1	3	0
Vitamin B6	1	6	0
Folate	4	4	0
Vitamin B12	0	7	0
Magnesium	1	0	0
Selenium	1	0	0

+ = nutrient intake associated with symptoms of depression

0 = no significant association

- = nutrient intake inversely associated with symptoms of depression

**Table 1-2 Whole food intakes associated with depression**

Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Food	Finding (+) positive association (0) no significant association (-) inverse association
Appelton et al., 2007	Northern Ireland, France	Cross-sectional	Neutral	10 602 men aged 50-59 years	Food frequency questionnaire	Fish intake	-
Astorg et al., 2008	France	Prospective cohort	Positive	1864 adult men and women aged 35-60 years	24-hour dietary records	Fish intake (men)  Fish intake (women)	-  0
Barberger-Gateau et al., 2005	France	Cross-sectional	Neutral	9280 men and women aged over 65 years	Food frequency questionnaire	Fish intake	-
Browne et al., 2006	New Zealand	Case-control	Neutral	80 new mothers	Food frequency questionnaire	Fish intake	0
Fulkerson et al., 2004	USA	Cross-sectional	Positive	4734 adolescent girls and boys	Food frequency questionnaire	Soft drinks	+

Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Food	Finding (+) positive association (0) no significant association (-) inverse association
Hakkarainen et al., 2004	Finland	Prospective cohort	Neutral	27 111 men aged 50-69 years	Diet history questionnaire	Fish intake	0
Hintikka et al., 2005	Finland	Cross-sectional	Neutral	2011 adult men and women aged 25-64 years	Food frequency questionnaire	Daily tea drinking	-
Jeffery et al., 2009	USA	Cross-sectional	Neutral	4655 women aged 40-65 years	Food frequency questionnaire	Energy dense foods	+
Liu et al., 2007	China	Cross-sectional	Positive	2579 college students	Food frequency questionnaire	Fruit intake	-
						Fast food intake	+
Miyake et al., 2006	Japan	Prospective cohort	Positive	865 pregnant women	Diet history questionnaire	Fish intake	0
Samieri et al., 2008	France	Cross-sectional	Positive	1724 men and women aged over 65 years	Food frequency questionnaire	Diet rich in pasta	+
Sanchez-Villegas et	Spain	Cross-	Positive	9670 adult men	Food frequency	Fish intake	0



Reference	Country	Type of study	Study quality rating*	Subjects	Dietary assessment method	Food	Finding (+) positive association (0) no significant association (-) inverse association
al., 2006		sectional		and women	questionnaire		
Silvers and Scott, 2002	New Zealand	Cross-sectional	Positive	4644 adults over age 15 years	Food frequency questionnaire	Fish intake	-
Sontrop et al., 2008	Canada	Cross-sectional	Positive	2061 pregnant women	Food frequency questionnaire	Fish intake	0
Tanksanen et al., 2001a	Finland	Cross-sectional	Positive	1767 adults aged 25-64 years	Food frequency questionnaire	Fish intake	-
Tanksanen et al., 2001b	Finland	Cross-sectional	Positive	3204 adults aged 25-64 years	Food frequency questionnaire	Fish intake	-
Timonen et al., 2004	Finland	Cross-sectional	Neutral	5689 adult men and women	Food frequency questionnaire	Fish intake	-
Woo et al., 2006	China	Cross-sectional	Positive	3313 adults aged over 65 years	Food frequency questionnaire	Vegetables	-

\*Based on the Quality Criteria Checklist of the Evidence Analysis Manual (Academy of Nutrition and Dietetics, 2012)

## Summary

Nutrient	-	0	+
Fish	6	6	0
Soft drinks	0	0	1
Pasta	0	0	1
Fruit	1	0	0
Vegetables	1	0	0
Fast food	0	0	1
Tea	1	0	0
Energy dense food	0	0	1

+ = food intake associated with symptoms of depression

0 = no significant association

- = food intake inversely associated with symptoms of depression

#### *1.2.4.2 Dietary patterns*

Kuczmarski et al. (2010) note that while individual nutrients or foods have been demonstrated to have an association with depression, dietary intake is complex and the interaction of nutrients makes it difficult to 'attribute the effects of a single dietary component to psychological well-being', thus it may be more appropriate to examine dietary patterns. They used the Healthy Eating Index (Guenther et al., 2008) as a measure of diet quality, or how well diets conform to the current national recommendations, and found that in minority and low socio-economic status American populations, self-reported symptoms of depression were significantly associated with poorer diet quality. This association has also been found in an Australian study (Jacka et al., 2010) that evaluated intake against recommended levels using the Australian Modified Healthy Eating Index (Throw, 2007). Most recently Jacka et al. (2011) demonstrated an inverse relationship between diet quality and depression, as well as an association between a high intake of processed or unhealthy foods with increased anxiety. Aspects of healthy diets have been evaluated in a small number of other studies. Cohen et al. (2002) found that people with mild and moderate psychological distress ate fewer fruit and vegetables and more high fat choices. Adults in Helsinki with poor mental health were less likely to adhere to dietary guidelines including the consumption of fruit, vegetables, reduced fat milk and wholegrains (Sarlio-Lahteenkorva et al. 2004). Adults with a history of suicide attempts were also more likely to underconsume fruit and vegetables (Li et al., 2009).

The association of depressive symptoms to dietary patterns has also been studied around the world. In Australia, Jacka et al. (2010) used a food frequency questionnaire to evaluate the diet of more than 1000 women and were able to classify their diets as 'traditional' (emphasising vegetables, fruit, meat and whole grains), 'western' (with higher intakes of fast foods and refined or processed grains and dairy products), or 'modern' (fruits, salads, fish, tofu, beans, nuts, yogurt and red wine). The western dietary pattern was associated with higher depressive scores, but there was no association between traditional or modern diets and

depressive scores. In Spain, Sanchez-Villegas et al. (2009) also used a food frequency questionnaire to assess participants' adherence to a Mediterranean dietary pattern (vegetables, fruit, nuts, cereal, legumes, fish, monounsaturated fatty acids, and moderate alcohol consumption) and monitored the cohort for incidence of depression for approximately four years. They found an inverse association between adherence to the Mediterranean dietary pattern and risk of depression with adjusted hazard ratios (95% confidence intervals) of depression for successive categories of adherence to the Mediterranean dietary pattern (relative to the lowest category of adherence) of 0.58 (0.44-0.77), 0.49 (0.36-0.67), 0.66 (0.50-0.86) and 0.74 (0.57-0.98) ( $P$  for trend  $<.001$ ). Aspects of the diet for which they also found an inverse dose-response relationship include intake of fruit and nuts, monounsaturated to saturated fatty acid ratio, and intake of legumes.

In the UK, food frequency questionnaires were used to classify the dietary patterns of Caucasian European office workers aged 35-55 years into 'whole food' or 'processed food' patterns (Akbaraly et al., 2009). Self-reported scores of depressive symptoms were taken approximately five years later. They found that participants with the highest intake of whole foods were less likely to report depressive symptoms, and those with high intakes of processed foods reported higher levels of depressive symptoms. The authors concluded that a processed food diet increases risk for depression, while a whole food diet is protective.

In Japan, Nanri et al. (2010) evaluated depressive symptoms of municipal employees. They measured dietary intake using a brief diet history questionnaire and derived 'healthy Japanese' (fruit, vegetables, soy, mushrooms and green tea), 'animal food' (fish, meat and egg), and 'Westernized breakfast' (bread, confectionaries, milk, yoghurt and egg) dietary patterns based on intake. They found that the healthy Japanese dietary pattern was associated with decreased prevalence of depressive symptoms, and there was no significant association between other dietary patterns and depressive symptoms. In Greece, pregnant women completed a food frequency questionnaire during pregnancy and a depression score post-partum (Chatzi et al., 2011). They identified both 'health

conscious' (vegetables, fruit, pulses, nuts, dairy products, fish and olive oil) and 'Western' dietary patterns and found that women who consumed diets that adhered to the health conscious dietary pattern were significantly less likely to experience high levels of post-partum depression.

#### 1.2.4.3 *Timing of meals*

Freeman (2010) writes that as we begin to understand the relationship between eating patterns and psychiatric disorders such as depression, we move from knowing '*what* we eat, to *why*, *how*, and *with whom*'. Insufficient evidence is currently available to answer these questions. With respect to *when* we eat, in children breakfast consumption has been associated with better self-reported mood (Wesnes et al., 2003) and lower self-reported depression scores (Murphy et al., 1998). Eating breakfast, lunch and dinner has been associated with lower self-reported depression scores in adolescents (Fulkerson et al. 2004). Higher levels of depression have also been found in adults who skip breakfast (Allgower et al., 2001; Gluck et al. 2001) and consume most of their energy at night (Gluck et al. 2001).

#### 1.2.4.4 *Energy intake*

While eating more or less than usual is widely regarded as one symptom of depression, there is very little evidence to demonstrate changes in eating patterns such as timing, frequency or settings of meals. Changes in energy intake have been demonstrated in studies that have induced mood states. Frost et al. (1982) experimentally induced low- and high-mood states to participants with low or high levels of restrained eating. Those with high levels of restrained eating induced into a low mood state experienced the greatest increase in energy intake. A more recent study measured both dietary restraint and disinhibition, and provided snacks to women who were exposed to neutral, positive or negative films aimed to create low or high mood states (Yeomans & Coughlan, 2008). Those who scored low on disinhibition ate the same amount in all three conditions. Those with high levels of

disinhibition and high levels of restraint ate most during the negative film, while those with low restraint ate most during the positive film. The authors of that study suggest that mood state, rather than stress, has a more significant impact on food consumption in women with high levels of disinhibition.

#### 1.2.5 Nutrition interventions for people with depression and anxiety

Porter and Evans (2008) reviewed nutrition interventions for mental health in Australia and New Zealand, and found only 13 studies. The studies demonstrated small, non-significant improvements in mental health with interventions to increase physical activity levels or provide dietetic or food skills education. These studies were mostly based on small sample sizes of inpatient populations with psychiatric illness and not transferable to the larger population of Australian adults with mild to moderate depression and/or anxiety. More recently, an Australian clinical trial of over 900 older adults found no improvement in depression scores following 6, 12 or 24 months of supplementation with 400µg folate and 100 µg vitamin B12 (Walker et al., 2010). That study also did not find support for potentiation of antidepressant medication with folic acid and vitamin B12 supplementation (Christensen et al., 2011).

Internationally, there have been several intervention studies that have trialed the effect of dietary modification or supplementation on depressive symptoms. Most of these trials have investigated folate or omega-3 polyunsaturated fatty acids, although there have been a small number of trials investigating other nutrients. These trials (summarised in the following sections) have generally involved small numbers of participants ( $n < 100$ ) and the body of evidence at this stage remains insufficient for the purposes of making dietary recommendations.

##### 1.2.5.1 *n-3 PUFAs*

Appleton et al. (2010) conducted an updated systematic review and meta-analysis of the literature on the use of *n-3* PUFAs for the treatment of depression. Based on 35 randomised controlled trials with considerable variations in study design, they

found a pooled effect size of 0.10 SD (95% CI: 0.02, 0.17), indicating a benefit for n-3 PUFAs greater than placebo. Greater effects were found in those with a diagnosed depressive disorder 0.41 (95% CI: 0.26, 0.55), and no benefit was found in trials where participants did not have a diagnosed depressive disorder. Bloch and Hannestad (2011) also conducted a systematic review and meta-analysis on the use of n-3 PUFAs for the treatment of depression and found that nearly all benefit of n-3 PUFA supplementation was removed after adjusting for publication bias. Trials that demonstrated the greatest benefit were generally those of short duration, that did not use intention-to-treat analysis, and those with highest baseline levels of depression. Overall, the evidence remains limited at best in support of n-3 PUFA supplementation for depression.

#### *1.2.5.2 Vitamins*

The most recent Cochrane review of folate treatment for depressive disorders was published in 2009 (Taylor et al., 2009). Based on the evidence of three randomised controlled trials, the authors suggest that 'folate supplementation may be effective when used in addition to conventional antidepressant medication'. Nahas and Sheikh (2011) describe the same randomised controlled trials and conclude that there is insufficient evidence to recommend folate for the treatment of depression, but that it is reasonable that patients with depression be screened and treated for folate deficiency. In response to these statements, Melong and Gardner (2011) write that the evidence is strong enough to recommend that physicians prescribe folate to all women with depression at a level of 500 µg daily, particularly in light of its safety profile and low cost. This is similar to the general Recommended Dietary Intakes for Australian women (Department of Health and Ageing, 2006) of 400 µg per day, and within the upper limit of 1000 µg per day.

Williams et al. (2005) concluded that studies of vitamin B6 have found it to be ineffective in the treatment of depression, except in pre-menopausal women. Where vitamin B6 has been used to treat symptoms of premenstrual syndrome including depression, a meta-analysis of trials found that supplementation up to 100 mg per day is beneficial in reducing symptoms (Wyatt et al. 1999). This is

twice the recommended safe Upper Limit of intake of 50 mg per day for adults, and significantly more than the 1.3 to 1.5 mg per day Recommended Dietary Intake (Department of Health and Ageing, 2006).

Thiamin has been shown to improve self-reported mood in young women when treated with 50 mg per day, compared with placebo (Benton et al., 1997). This is considerably greater than the Recommended Dietary Intake of 1.1 mg per day (Department of Health and Ageing, 2006).

High doses of vitamin C have been shown to reduce severity of depression (Cocchi et al., 1980; Naylor & Smith, 1981) and to lower depressive scores in healthy individuals (Brody et al. 2002). These studies provided 3 g per day of ascorbic acid which is greater than both the RDI of 45 mg/day and the recommended upper level of intake of 1000 mg/day (Department of Health and Ageing, 2006).

#### *1.2.5.3 Minerals*

Magnesium is another nutrient of interest for which low levels of intake have been associated with depression (Jacka et al., 2009). Magnesium treatment has been used to achieve rapid recovery from depression (Eby & Eby, 2006), however that study protocol delivered 125-300 mg of magnesium four times per day, which is considerably greater than the Australian recommended upper level of intake as a supplement of 350 mg/day for men and women (Department of Health and Ageing, 2006).

A systematic review of randomised controlled trials for zinc supplementation in depression found four trials in which zinc was provided as a treatment, or in conjunction with antidepressant treatment (Lai et al., 2011). They found that zinc in conjunction with antidepressant treatment was more effective at improving depressive symptoms than antidepressants plus placebo, and limited evidence for using zinc alone to prevent or treat depressive symptoms. Between 7 and 25 mg zinc per day was administered in these trials, compared to Recommended Dietary



Intakes of 8 mg/day for Australian women and 14 mg/day for Australian men (Department of Health and Ageing, 2006).

Like vitamin B6, calcium has been used in trials for reduction of symptoms of premenstrual syndrome including negative affect. Treatment with 1200 mg of calcium per day was more effective than placebo in reducing symptoms (Thys-Jacobs, 2000). Again, this is greater than the Recommended Dietary Intake of 1000 mg per day, but within the Upper Limit of 2500 mg per day (Department of Health and Ageing 2006).

Supplementation with 100 µg of selenium per day during pregnancy has been demonstrated to lower post-natal depression scores (Mokhber et al., 2010). Eight weeks of supplementation also increased serum selenium levels and lowered depression scores in nursing home residents (Gosney et al., 2008), and five to six weeks of supplementation with 100-150 µg per day in adults has been shown to significantly increase mood scores (Benton & Cook, 1991; Scott, 1993).

Depression scores have also been lowered following supplementation with iron (125 mg FeSO) from 10 weeks to nine months post-partum relative to placebo (Beard et al. 2005).

Such large doses of supplements may not be needed to provide a benefit. A study that provided a supplement containing 995 kcal of energy and 100% of the Reference Nutrient Intakes to hospital patients over age 65 for six weeks found that this group had significantly lower depression scores at six months than patients who received a placebo (Gariballa, 2007).

#### 1.2.6 Mechanisms

Kaplan et al. (2007) suggest that nutrition therapy in mental illness has not been adopted in usual practice because the ideas do not fit with established paradigms. They suggest four mechanisms through which nutrient intake may have an effect on mood, as brain metabolic pathways may become deficient and result in mood symptoms. These include: (1) *inborn errors of metabolism*, where the provision of

vitamins as cofactors or coenzymes could correct the diminished binding affinity for a coenzyme with impact on brain function, (2) *deficient methylation processes*, for example the role of folate and vitamin B12 in the methylation of homocysteine to methionine (3) *alteration of gene expression by nutrient deficiency*, and (4) *long-latency diseases*, where a disease process may be the result of a long term nutrient deficiency such as calcium deficiency and osteoporosis.

Both Bodnar and Wisner (2005) and Bamber et al. (2007) propose three mechanisms through which nutrition could improve mental health. These are: (1) by correcting nutrient deficiencies which may contribute to poor mental health, (2) by providing adequate nutrition to people with psychiatric conditions associated with metabolic abnormalities which increase nutrient requirements, and (3) by improving the effectiveness of antidepressant medication.

#### 1.2.7 Recommendations

At this time, there are no evidence-based recommendations for medical nutrition therapy of depression or anxiety. The following suggestions, which would be suitable for dietitians and medical practitioners working with patients with these conditions, take into account issues commonly associated with these illnesses, and are consistent with nutrition recommendations suitable for the general population.

- Correct any known nutrient deficiencies.
  - Where blood tests have demonstrated a nutrient deficiency, assist the client to improve their intake through the inclusion of nutrient rich foods, or supplements where necessary.
- Address nutritional adequacy.
  - Assess the client's intake of whole foods through comparison to the Australian Guide to Healthy Eating, or where detailed dietary records are available, to the Recommended Dietary Intakes. Assist clients to

increase their intake of foods or nutrients that are consumed in insufficient amounts.

- Consider dietary recommendations for any comorbid physical illness.
  - There is a strong link between depression and physical illnesses such as cardiovascular disease, diabetes and cancer. Successful management of these conditions may also improve mental health.
- Manage weight where underweight or overweight are evident.
  - There are many complex reasons why weight and mental health are often interlinked. Provide simple advice to alter energy balance and adjust body weight according to current guidelines (DAA, 2012).
- Collaborate with a psychologist or other mental health professional for management of problematic eating habits such as binge eating.
  - Where non-hungry eating has become problematic and is linked to stress, emotion or other psychological factors, refer the client to a psychologist or other mental health professional who is more qualified to assist with this behaviour change.
- In special circumstances, and in collaboration with the treating doctor, consider supplementation (for example, folate supplementation to enhance the effectiveness of antidepressant medication).
  - Evidence for nutrient supplementation in depression and anxiety is very limited, and it would be prudent to supplement at levels within the Recommended Dietary Intake.

#### 1.2.8 Conclusion

Dietary advice should be provided to patients with depression and/or anxiety to reverse and prevent malnutrition and nutrient deficiencies, to promote health, and

to reduce the burden of comorbid physical illness, however there is only limited evidence for the use of targeted supplementation to treat these conditions.

### **1.3 Exercise for the prevention and treatment of depression and anxiety**

Due to the large body of evidence in support of exercise as a treatment for mental illness, exercise physiologists in training are learning of its benefits and being recommended to promote exercise as strategy for management of mental health conditions. The evidence summarised here can be used to provide suggestions for the use of exercise when working with patients with depression and anxiety.

#### **1.3.1 Evidence for prevention**

The US Physical Activity Guidelines Advisory Committee (2008) suggested that physical activity could protect against symptoms of anxiety and depression, and against the development of an anxiety or depressive disorder.

Goodwin (2003) used multiple logistic regression analysis to compare the prevalence of mental disorders between those that did and did not report participating in physical activity amongst American adult respondents in the National Comorbidity Survey (n=8098). Goodwin reported a significant dose-response association between participation in regular physical activity and decreased prevalence of current major depression and anxiety disorders. Associations between mental health and levels of physical activity have since been reported in other studies. This association, while well established, does not necessarily indicate a role for physical activity in the prevention of depression or anxiety. No causal relationship has been established, and the association may indicate a reduced desire to participate in physical activity by those already experiencing depression or anxiety. Only two longitudinal studies have demonstrated a decreased risk of depression over time in participants who are more physically active (Farmer et al., 1988; Strawbridge et al., 2002). A review of studies linking low levels of physical activity with depression found that depression was least likely to occur in those individuals who participated in vigorous physical

activity rather than lower intensity activity, and in those who participated in leisure time physical activity rather than other domains of physical activity (Teychenne et al., 2008).

Healthy American women surveyed in the Epidemiologic Follow-up Study to the first National Health and Nutrition Examination Survey (NHANES 1) who were participating in moderate amounts of recreational physical activity were found to be half as likely to develop depression than women participating in little or no recreational physical activity (Farmer et al., 1988). That longitudinal study over eight years found that lack of physical activity is an independent predictor of depression, and is associated with depressive symptoms (Farmer et al., 1988). Other epidemiological studies have found that depression is more common in sedentary than active men (Lobstein et al., 1983), that physical activity levels were negatively associated with depressive symptoms over three years (Lobstein et al., 1983), and those with lower levels of physical activity have more severe depressive symptoms (Moore et al., 1999). Diminishing physical activity with age was also associated with a greater incidence of depression (Lampinen et al., 2000).

Evidence from matched cohorts over 10 years has shown that physical activity is protective against depression, with an increase of one MET unit significantly reducing the risk of depression by 8% (Backmand et al., 2003). This has also been displayed by the association between college physical activity and reduced risk of developing depression in later life (Wyshak, 2001). The latter study did not evaluate physical activity patterns in later adulthood, indicating that the risk of depression remained lower even when physical activity levels declined. This supports Salmon's (2001) statement that "Exercise training recruits a process which confers enduring resilience to stress".

### 1.3.2 Evidence for treatment

#### 1.3.2.1 *Meta-analyses for treatment of depression and anxiety with exercise*

Three recent meta-analyses support the use of exercise to treat anxiety and depressive disorders. A review of exercise training to reduce anxiety symptoms in patients with chronic physical illness found a mean effect size for improvement in anxiety symptoms of 0.29 (CI 0.23 – 0.36) (Herring et al., 2010). Two meta-analyses published in 2009 evaluated the effect of exercise as a treatment for depression. The Cochrane review (Mead et al., 2009) looked at studies of patients with clinical depression that compared exercise with no treatment or a control intervention including psychotherapy or pharmacological treatment. Of 23 trials identified, there was a large pooled effect size for change in depression scores at -0.82 (95% CI of -1.12, -0.51). Rethorst, Wipfli and Landers (2009) reviewed 58 studies that compared an exercise intervention with only no treatment or waitlist controls. The studies also included nonclinical samples and found an effect size for change in depression scores of -0.80 (95% CI -0.92, -0.67). For the 17 clinical samples alone there was an effect size of -1.03. For the 40 studies using nonclinical participants the effect size was -0.59. This suggests exercise interventions may be particularly helpful in clinical samples with depression.

Perhaps the most insightful study to date compared physical activity and medication in patients with major depressive disorder (Blumenthal et al., 1999). This study found that three weekly sessions of moderate-intensity aerobic activity, antidepressants and a combination of the two treatments were all equally effective in reducing depression over 16 weeks. While medication reduced depression levels more quickly, patients in the exercise group were least likely to have relapsed 10 months following the intervention (Babyak et al., 2000). In a later study by the same authors, supervised group-based exercise and home-based individual exercise were compared to medication and placebo (Blumenthal et al., 2007). Both forms of exercise were found to be as effective as medication in achieving remission from depressive symptoms after four months.

Unfortunately, many of the early studies reporting benefits of physical activity in reducing mental illness had been disregarded due to a lack of scientific rigour. Common limitations of the studies include the use of non-clinical volunteers, brief follow-ups, and lack of or inadequate experimenter blinding and intention-to-treat statistical analyses (Lawlor & Hopker, 2001). Studies conducted in the past decade have demonstrated greater scientific rigour, for example, all studies reviewed by Perraton et al. (2010) since 1999 have utilised intention-to-treat analyses, which had not been used by any of the trials prior to this time. The body of evidence for the treatment of depression with exercise has grown substantially in recent years, and there have been several published meta-analyses and systematic reviews of their effects. The Stathopoulou et al. (2006) review found a large effect size of 1.42, and also associated more recent studies with larger effect sizes. The evidence at this stage is now strong enough to suggest that exercise should be recommended as an adjunctive treatment for depression along with other established treatments (Daley, 2008). Two 2013 systematic reviews of exercise in the treatment of major depression have presented conflicting results. One study reported only a low quality of evidence for exercise as an augmentation to treatment (Danielsson et al., 2013), while the other reported a moderate level of evidence for exercise intervention in the treatment of depressive disorders (Josefsson et al., 2013).

There is limited evidence for improvements in anxiety through exercise, with most studies evaluating only single sessions of exercise and finding reductions in state anxiety for two to four hours following the cessation of exercise (Martinsen & Raglan, 2007). In patients with panic disorder, exercise has been found to be more effective than placebo and less effective than medication (Broocks et al., 1998). In one study, exercise was shown to be as effective as cognitive behavioural therapy in those with anxiety disorders (McEntee & Halgin, 1999), and, in another study, to be more effective in augmenting treatment outcomes of group cognitive behavioural therapy than nutrition education (Merom et al., 2007). A 2011 review by Carek et al. found exercise to be an effective and cost-efficient treatment

alternative for anxiety disorders, but noted that exercise has not been shown to reduce anxiety as effectively as medication.

More data from clinical trials is needed to support physical activity as a sole treatment for depression (Brosse et al., 2002) or anxiety. This may explain why directors of clinical psychology programs do not view exercise as a treatment for mental health problems (Faulkner & Biddle, 2001). Exercise is not mentioned in the current Australia and New Zealand clinical practice guidelines for the treatment of depression (Ellis et al., 2004). Continued research to demonstrate feasibility, effectiveness and acceptance of exercise as a treatment for depression and anxiety is required.

#### *1.3.2.2 Intensity of exercise*

There have been claims that either moderate-intensity physical activity or high-intensity physical activity is better at improving mental health. Strenuous exercise has reduced depressive symptoms more than relaxation or no treatment (McCann & Holmes, 1984), and maximal exertion has reduced tension and increased self-esteem (Pronk et al., 1995). Singh (1997) claims that intensity of physical activity is a significant independent predictor of reductions in depression. Yet, other studies have shown psychological benefits obtained from moderate intensity exercise, but not from high-intensity exercise in healthy subjects. Indeed, high intensity exercise has been associated with decreased positive affect both during and after exercise (Ekkekakis & Petruzzello, 1999), and excessive physical activity can lead to overtraining, which in turn leads to psychological symptoms that mimic depression (Paluska & Schwenk, 2000). Weyerer (1994) states that mental health can be improved by low- or moderate-intensity activity. One study reports conflicting results, where high levels of physical activity were associated with low levels of depression in women, and high levels of depression in men (Joiner & Tickle, 1998).

Perhaps the most insight into optimal program design can be gained from a study comparing walking and jogging (Sexton et al., 1989). Joggers obtained greater fitness levels, and at 6-months post intervention higher fitness levels were



associated with reduced anxiety and maintenance of change in physical activity and fitness level. However, joggers were also more likely to drop out. Furthermore, both walking and jogging produced reductions in anxiety, depression and global symptoms, thus the only advantage of the jogging program was longer-term adherence for those who did not drop out.

Following a 12-week aerobic training program physical and psychological outcomes were maintained for at least 1-year following the intervention regardless of maintenance of activity levels (DiLorenzo et al., 1999). This suggests that jogging, providing the sole added benefit of improved fitness, does not provide an advantage for mental health outcomes.

#### *1.3.2.3 Dose of exercise*

There is also considerable controversy over the amount of physical activity required to obtain improvements in mental health. While Dunn (2001) suggests that there is little evidence for dose-response effects of physical activity on depression, several studies have been published with definite statements regarding the amount of physical activity required to obtain mental health benefits. One study found that considerable amounts of physical activity, greater than 92 minutes per day, were needed to protect against common mood and anxiety states (Bhui & Fletcher, 2000). Other studies have found that just two to three weekly bouts of exercise can decrease depression and stress (Hassmen et al., 2000), and that exercise occurring even less than twice per week can reduce depressive symptoms (Gazmararian et al., 2000).

Most aerobic exercise interventions have used protocols of 30 minutes of exercise at 60 to 80% of maximum heart rate for three days per week over eight weeks (Perraton et al., 2010). This is less than the current Australian National Guidelines for Physical Activity, which recommend at least 30 minutes of moderate physical activity on most or all days of the week (Department of Health and Ageing, 2004). Dunn et al. (2005) have found that patients with major depression who exercised in accordance with the public health recommendations (approximately three to five

times per week, expending 17.5 kcal/kg/week) experienced greater reductions in depression than those exercising at lower levels (one session per week, expending 7 kcal/kg/week).

In a meta-analysis of randomised controlled trials, an association between the duration of the intervention and the magnitude of improvement in depression was found (Krogh et al., 2011). However, those trials with long term follow up beyond the period of the intervention demonstrated no long term benefit. This evidence suggests that improvement in depressive symptoms increases with prolonged participation in exercise, and that participation must be maintained to experience an ongoing benefit.

#### *1.3.2.4 Type of exercise*

Both aerobic and resistance training programs have demonstrated improvements in mental health. A 20-week unsupervised weight lifting program reduced depressive symptoms in participants both during the intervention and at 26-months follow-up, despite only 30% of participants continuing to train at 26-months (Singh et al., 2001). Another resistance training program was found to increase vitality and decrease pain in the elderly in addition to reducing depressive symptoms (Singh et al., 1997). Other studies have found aerobic activity to have greater benefit than resistance training, with one aerobic training program providing a reduction in depression that did not occur with resistance training (Pennix et al., 2002), and another 10-week program with aerobic exercise providing a greater reduction in tension-anxiety and depression than a strength training and flexibility program (Steptoe et al., 1989). Several other studies have shown that both aerobic and non-aerobic exercise can reduce symptoms of depression (Dunn et al., 2001; Martinsen et al., 1989; Ossip-Klein et al., 1989), and this reduction in depression occurs regardless of any increase in fitness (Martinsen et al., 1989; Sexton et al., 1989). In patients with trait anxiety or generalised anxiety disorder, aerobic exercise has been shown to be more effective than strength or mobility exercises (Steptoe et al., 1989).

There is a greater body of evidence to support aerobic exercise in the treatment of depression (Perraton et al., 2010), however the only trials to compare aerobic and resistance exercise did not find any significant difference in outcomes between the two modes (Doyne et al., 1987; Martinsen et al., 1989). A variety of modes of aerobic exercise, including running, walking, cycling and dancing, appear to be effective, and Perraton et al. (2010) suggest that this highlights the importance of aerobic activity, rather than the type of aerobic activity. They also note that this allows the clinician flexibility to prescribe the client's preferred mode of exercise.

#### *1.3.2.5 Location*

All reported trials have used indoor locations, with most reporting fitness centres (Perraton et al., 2010). Thompson Coon et al. (2011) reviewed the evidence comparing the impact of exercise in indoor or outdoor settings on mental well-being. The studies reviewed did not include participants with clinical depression, but did find that in the general population, exercise outdoors is associated with greater 'feelings of revitalization and positive engagement, decreases in tension, confusion, anger, and depression, and increased energy'. Participants also 'reported greater enjoyment and satisfaction with outdoor activity and declared a greater intent to repeat the activity at a later date'. In Australia, participation in outdoor physical activity is possible throughout the year, but would not be recommended on days with extreme heat. Individual preferences and cultural expectations about exercise outdoors must also be respected.

#### *1.3.2.6 Other programming considerations*

Several studies have evaluated either group or individual exercise interventions and both have been found to be effective (Perraton et al., 2010). Studies that have compared group versus individual interventions have also found both to be effective (Blumenthal et al., 2007; Craft et al., 2007; Legrand and Heuze, 2007). In the Perraton et al. (2010) review, 18 of 20 studies involved supervised exercise interventions. A variety of professionals were involved in supervision; however it is

interesting to note that the models used in these studies may be too costly to replicate on a large scale.

### 1.3.3 Mechanisms

Despite strong evidence for exercise as a treatment for depression and anxiety, the mechanism for this benefit remains unknown. As Strohle (2009) remarks ‘the mechanisms responsible for exercise-related improvements in depression and anxiety disorders are not all known, and it is most likely to be a complex interaction of psychological and neurobiological mechanisms underlying, mediating and/or moderating these effects’. Commonly proposed mechanisms include psychological and psychosocial factors such as increased self-efficacy, sense of mastery, social reinforcement and distraction, and biochemical and physiological factors that involve beta-endorphins, central monoamines, the hypothalamic-pituitary-adrenal axis, and thermogenesis (Fox, 1999). Table 1-3 provides a summary of the major theorised mechanisms with a list of citations to studies that have described the mechanism.

**Table 1-3 Proposed mechanisms for the reduction of depression and anxiety through physical activity**

<b>Mechanism</b>	<b>References</b>	<b>Theory</b>
Opioids (beta endorphin)	(Brosse et al., 2002; Fox, 1999; Paluska & Schwenk, 2000; Morgan, 1985; Delgado, 2000; Delgado & Moreno, 2000; Iqbal et al., 1989; Hirschfeld, 2000; Klimek et al., 1997; Charney, 1998; Schatzberg, 1998; Dunn et al., 1996; Dishman, 1997a; Dishman, 1997b; Chaouloff, 1989; Chaouloff, 1997a; Chaouloff, 1997b; Hoffman, 1997; Yeung, 1996; Petruzzello et al., 1991; Nicoloff & Schwenk, 1995; Thoren et al., 1990; Carr et al., 1981; Moore & Blumenthal, 1998; Wildman et al, 1986; Janal et al., 1984; Lobstein & Rasmussen, 1991; Darko et al., 1992; Krittayaphong et al., 1996; Ransford, 1982; Howlett et al., 1984)	Beta-endorphin is found in increased levels in the blood during and after exercise. It has been suggested that this causes euphoria, but has only been reported in a few cases, and no correlation has been found between beta-endorphin levels and mood. Naxolone (an antagonist) blocked endorphin-generated pain threshold elevation but did not diminish mental health benefits following exercise. Any effects that do occur appear to be short-term.
5-Hydroxytryptamine (%-HT, central serotonin)	(Fox, 1999; Chaouloff, 1997b)	There is increased synthesis and metabolism of 5-HT in the brain with acute exercise, with unknown effect on mood.
Central Monoamines (noradrenaline/norepinephrine,	(Brosse et al., 2002; Fox, 1999; Paluska & Schwenk, 2000; Morgan, 1985; Ransford, 1982; Lechin et al., 1996;	Exercise increases brain aminergic synaptic transmission, the same mechanism that is used in

Mechanism	References	Theory
dopamine, serotonin)	Lechin et al., 1995a; Lechin et al., 1995b; Soares et al., 1994; Weicker & Struder, 2001; Blomstrand et al., 1988; Delgado, 2000; Delgado & Moreno, 2000; Iqbal et al., 1989; Hirschfeld, 2000; Klimek et al., 1997; Charney, 1998; Schatzberg, 1998; Dunn et al., 1996; Dishman, 1997a; Dishman, 1997b; Chaouloff, 1989; Chaouloff, 1997a; Chaouloff, 1997b)	antidepressant medications and electroconvulsive therapy.
HPA (hypothalamic-pituitary-adrenal) axis	(Brosse et al., 2002; Lesch et al., 1988; Ehlert et al., 2001; Gold et al., 1988a; Gold et al., 1988b; Gold et al., 1995; Dienstbier, 1991; Luger et al., 1987; Wittert et al., 1996; Blumenthal et al., 1991; Lanfumey et al., 2000; Mokrani et al., 1997; Pitchot et al., 2001; Akil et al., 1993)	HPA axis imbalances (excess) occur in depression, and exercise reduces the HPA axis response to stress.
Thermogenesis	(Fox, 1999; Paluska & Schwenk, 2000; Salmon, 2001; Petruzzello et al., 1991; Koltyn, 1997; Dishman, 1995; Martinsen, 1987)	Increase in body temperature leads to increased relaxation and improved mood. (Similar to effect of sauna, bath, or hot shower)
Fitness (Aerobic)	(Fox, 1999; Salmon, 2001; Steptoe et al., 1989; Mutrie, 2000; Craft & Landers, 1998; Fox, 2000; Spence & Poon, 1997;	Increases in fitness rarely result in changes in depression, anxiety and self-perceptions. The improvement in

<b>Mechanism</b>	<b>References</b>	<b>Theory</b>
(no correlation)	Fasting & Gronningsaeter, 1996; Martinsen et al., 1989; Simons & Birkimer, 1988)	mental health appears to be the same with both aerobic and other forms of exercise.
Muscle Relaxation	Fox, 1999	Proposed to reduce anxiety.
Cerebral Blood Flow	Fox, 1999	Proposed to increase and improve mental health during exercise.
Neurotransmitter Efficiency	Fox, 1999	Proposed to be enhanced during exercise.
Social Interaction and Support	Fox, 1999	Social interaction leads to social support which then improves self-esteem and increases life satisfaction.
Process Factors	Fox, 1999	Regular participation in exercise leads to changes in mental well-being.
Visceral-Afferent Feedback	(Paluska & Schwenk, 2000; Petruzzello et al., 1991)	There is an increase in afferent impulses from muscular and autonomic activity during exercise, stimulating the reticular activating system. This stimulation continues until it reaches a threshold where an inhibitory mechanism is stimulated, having an

Mechanism	References	Theory
		arresting effect on the RAS, dampening cortical stimulation for a prolonged period.
Exercise Self-Efficacy	(Bandura, 1977; Brosse et al., 2002; Fox, 1999; Harter, 1978; McAuley et al., 2000; Paluska & Schwenk, 2000; Petruzzello et al., 1991)	Successfully adopting regular exercise, being a challenging task, increases exercise self-efficacy, which can then be generalized to global self-efficacy.
Improved Self-Evaluations: Body Image, Self-Esteem, Self-Worth	(Brosse et al., 2002; Fox, 1999; Salmon, 2001; Blumenthal et al., 1999; McAuley et al., 2000; Bosscher, 1993; Ossipklein et al., 1989; Stice et al., 2000; McAuley et al., 1997; Folkins & Sime, 1981)	fat loss and improved muscle fitness improved fitness, skills
Mastery, Self-Determination, Empowerment, Autonomy, Personal Control	(Bandura, 1977; Fox, 1999; Ismail & Trachtman, 1973; Paluska & Schwenk, 2000; Petruzzello et al., 1991)	Adopting exercise increased confidence and skills, leading to increased control and success that carries over into everyday life.
Distraction from negative emotions/thoughts	(Brosse et al., 2002; Paluska & Schwenk, 2000; Morgan, 1985; Salmon, 2001; Petruzzello et al., 1991; Craft & Landers, 1998; Hill, 1987; Bahrke & Morgan, 1978; Just & Alloy, 1997; Nolenhoeksema & Morrow, 1993; Dienstbier, 1989)	Diversion from unpleasant stimuli.



<b>Mechanism</b>	<b>References</b>	<b>Theory</b>
Improved retrieval of positive thoughts	(Salmon, 2001; Clark et al., 1983)	Believed to be enhanced during physical activity.
Social Reinforcement	(Brosse et al., 2002; Hughes, 1984)	Praise from others regarding healthy behaviours acts as positive reinforcement.
Opponent-Process Model	(Petruzzello et al., 1991; Solomon, 1980)	Anxiety associated with exercise remains constant, and relaxation associated with exercise becomes increasingly stronger with training. Variety of mechanisms to promote relaxation, eg. endorphins.
Cognitive Dissonance	(Petruzzello et al., 1991; Festinger, 1957)	In order to persist with an activity (exercise) that others find stressful, one must find reasons to continue. Putting a positive spin on exercise may produce a positive shift in attitude and mood, so that the harder one works at exercise, the better they will feel about it.
Information Processing	(Petruzzello et al., 1991; Farha & Sher, 1989; Morgan et al., 1980)	Subjects are not reporting anxiety as much as they are reporting physical changes.

### 1.3.4 Recommendations

Based on the evidence described, the following recommendations should be considered when working with clients to improve their mental health through exercise.

1. All adults should aim to meet the National Guidelines for Physical Activity (Department of Health and Ageing, 2004) to assist in the prevention of mental illness.
2. Exercise should be used in conjunction with other treatment modalities. In cases of mild depression, exercise may be considered as a sole treatment if the condition is closely monitored. In cases of more severe depression, standard treatment such as medication should be considered initially due to faster-acting mechanisms of improvement.
3. For anxiety, the treatment effects of exercise appear to be acute, lasting no more than half a day, therefore exercise should be performed at least once daily to limit symptoms of anxiety.
4. Both moderate and strenuous, aerobic and resistance exercises have been demonstrated to be effective in improving mental health. Patients should be advised to pursue the type and intensity of exercise that best matches their interests, lifestyle and personal preferences.
5. While as few as three sessions of exercise per week may elicit improvements in mental health, many studies demonstrate greater effects with higher doses, and it may be easier for patients to adopt behaviour changes that are performed consistently, i.e. scheduled into their daily routine.
6. Where possible, patients should be encouraged to participate in outdoor activities, as exercise outdoors has been associated with greater psychological benefit.

## 1.4 Lifestyle interventions in primary care

### 1.4.1 Referral to others

Team care arrangements and exercise referral schemes generally involve referral from a GP or practice nurse to an exercise practitioner in an alternate setting (Chan et al., 2011; Dugdill et al., 2005). Exercise referral in the primary care setting is popular because of the high frequency with which health professionals such as GPs and practice nurses come into contact with the general public. These health professionals are also believed to be a credible source of health advice and likely to be influential in changing behaviours (Graham et al., 2003).

While most studies of exercise referral schemes (in the UK) have used randomised controlled trial research designs, Dugdill et al. (2005) critically reviewed two on-going, large-scale 'real world' evaluation studies of exercise referral schemes. They found that participants referred in these schemes were predominantly female, with the largest number of referrals from the 46-60 year age category. The most popular reasons for referral were being overweight (37%), hypertension (13%) and mental illness (9%) in one study, and arthritis (28%), back pain (26%) and overweight (23%) in the other. Patients who did not attend their referred exercise practitioner cited lack of time, unsuitable appointment time, or lack of motivation as reasons for non-attendance. Younger patients (under age 30) were least likely to attend, and older patients (over age 60) were most likely to attend. More than 50% of referred patients did not complete the referred program. Older patients were most likely to complete the program than younger patients, and males were more likely to complete the program than females. Participation in referred exercise programs resulted in small but significant improvements in resting heart rate, blood pressure and body mass index.

In the Dugdill et al. (2005) report, 76% of referrals were made by GPs, 19% by practice nurses and a further 5% by cardiac rehabilitation nurses. The rate of adherence was higher for cardiac rehabilitation nurses (57%) and practice nurses (45%) than GPs (32%). There was a small increase in participation in physical

activity (21 minutes per week) among participants who completed the 12-week exercise intervention and this was sustained at 12-months follow-up. They concluded that exercise referral schemes were most effective for older adults with prior significant health problems.

With regards to nutrition, it is recommended that GPs and practice nurses (PNs) screen their patients, provide basic advice, and then refer patients requiring further assistance to a dietitian; however this is not always practical to achieve (Mitchell et al., 2011). Mitchell et al. (2011) found that Australian PNs had more confidence than GPs to provide nutrition counseling, although most patients reported that they would be more likely to follow nutrition advice from a GP than a PN. Dietitians surveyed in the Mitchell study felt that PNs did not have the necessary knowledge to provide individual dietary advice, and that they should provide only brief nutrition advice before referring to a dietitian. A survey of general practice medical educators (GPMEs) in Australia and New Zealand found that GPMEs feel that nutrition is an important but 'mostly superficially addressed component of health care in general practice' (Ball et al., 2010). Identified barriers to providing nutrition care in general practice include lack of time, financial disincentives, perceived inadequate skills and available training in nutrition counseling, ambiguous attitudes and differing perceptions about the role of GPs in providing nutrition care (Ball et al., 2010).

#### 1.4.2 Counselling and active scripts

Eakin et al. (2000) remark that primary care based physical activity interventions have a greater reach than many other types of health promotion because they are an effective means of reaching a large segment of sedentary adults. However, it has been argued that there is inadequate screening in primary care for both behavioural risk factors (Babor et al., 2004) and depression (Banazak et al., 1996). There is a low prevalence of physical activity and nutrition counselling by GPs (McKenna et al., 1998; Pinto et al., 1998; Podl et al., 1999), and this level decreases in patients with mental disorders (Desai et al., 2002). Many barriers to promoting physical activity have been reported including lack of time, lack of

financial incentive, insufficient educational materials, and patients' preference for pharmaceutical therapy (Bull et al., 1995; McKenna et al., 1998). Early studies demonstrate that when physical activity or nutrition counselling is performed in primary care, it is often of short duration (Russell & Roter, 1993) and is ineffective (Albright et al., 2000; Arborelius & Bramberg, 1994; Campbell et al., 2000; Lewis & Lynch, 1993), Little et al., 2001; Rosen et al., 1984, Wee et al., 1999). This may be due to the fact that most GPs provide advice rather than patient-centred discussion (Arborelius & Bramberg, 1994), and most patients in primary care want GPs to use a patient-centred approach (Little et al., 2001).

A review of trials of physical activity counselling by GPs (Eden et al., 2002) found mixed results. The studies reviewed included advice, assistance with perceived self-efficacy and barriers, mailed educational materials, referrals to community resources, and written exercise prescriptions. Due to the small number of studies included (n=8), the authors were unable to determine any relationship between components of the intervention and efficacy. Studies identified to have used the transtheoretical model of behaviour change also had mixed results.

A 2008 systematic review of single risk factor interventions aimed at increasing physical activity in primary care for patients with at least one chronic disease found no effect in two of three trials (Hudon et al., 2008). The third trial reported a positive short-term effect with an intensive intervention based on the theory of planned behaviour and involving practice nurses.

A review of studies addressing multiple behavioural risk factors in primary care found the most evidence for interventions to reduce smoking and alcohol use (Goldstein et al., 2004). However, there was only limited evidence for the efficacy of physical activity interventions. It was found that dietary counseling was effective when provided at medium to high intensities by specially trained clinicians in high-risk patients.

Specific physical activity interventions have generally been found to be ineffective in increasing physical activity levels (Burton et al., 1995; Harland, et al., 1999;

Hillsdon et al., 2002; Lawlor & Hanratty, 2001; Norris et al., 2000), although some have increased physical activity (Calfas et al., 1996; Halbert et al., 2001; Kerse et al., 1999; Marcus et al., 1997; Petrella et al., 2003; Stevens et al., 1998; Writing Group for the Activity Counseling Trial Research Group, 2001) or readiness to change physical activity behaviours (Calfas et al., 1996; Halbert et al., 2001). Some studies have found increased physical activity levels in both control and intervention groups (Bull et al., 1996; Bull et al., 1998; Halbert et al., 2000). The poor results of these interventions becomes apparent with only one study reporting maintenance of physical activity levels at 12-months (Elley et al., 2003).

A review of 21 randomized controlled trials that used dietary counseling in primary care settings found that 'dietary counseling produces modest changes in self-reported consumption of saturated fat, fruits and vegetables, and dietary fibre' (Pignone et al., 2003). Effectiveness of the intervention was greater for intensive rather than brief interventions. GP endorsement appears to increase the nutrition intervention effect (Hunt et al., 2001; Lazovich et al., 2000), but training GPs to perform nutrition counselling has been effective in some studies (Ockene et al., 1999; Tziraki et al., 2000) and minimally effective in others (Moore et al., 2003). Van Binsbergen, Delaney, and van Weel (2003) report that evidence-based nutritional advice is hampered by a lack of nutritional intervention studies, difficulty of translating nutritional interventions into practice, and difficulty translating to the setting of primary care.

#### 1.4.3 Characteristics of effective interventions

Fleming and Godwin (2008) conducted a systematic review of randomised controlled trials of lifestyle interventions in primary care. Seven studies were identified that took place in a primary care setting and were conducted by primary care providers such as general practitioners or practice nurses. Outcome measures were physical or health oriented rather than behavioural. Only two of the seven studies demonstrated consistent positive effects of outcomes such as blood pressure and lipid levels, and these effects were small in magnitude. They did not find any benefit in having the intervention delivered by either a nurse or a doctor, or

by focusing on either diet or exercise. They concluded that lifestyle counselling interventions provided by primary care providers in primary care settings delivered marginal benefit for primary prevention.

An earlier review of primary care based physical activity interventions (Eakin et al., 2000) found that factors associated with greater short-term effect on physical activity outcomes included focusing on physical activity rather than multiple risk factor interventions, providing individually-tailored interventions, and providing written materials. Brief counselling sessions (3-10 minutes) were as effective as lengthy counselling sessions. There was no obvious benefit of follow up phone calls, counselling or posted support materials. Interventions based on theories of behaviour change were no more effective than interventions not based on explicit theories of behaviour change. A more recent review of transtheoretical model-based dietary interventions in primary care also found insufficient evidence to conclude there were benefits of the model (Salmela et al., 2009).

Other factors that have been demonstrated to be effective in increasing physical activity behaviours and that could be incorporated into primary care include continuing interventions (Simons-Morton et al., 1998), the inclusion of multiple intervention components (Simons-Morton et al., 1998), computer-based programs (Calfas et al., 2002), internet-based physical activity interventions (Marcus et al., 2009), targeting a specific behaviour (Calfas et al., 2002), encouraging walking (Hillsdon & Thorogood, 1996), providing pedometers (Bravata et al., 2007) and not requiring attendance at a facility (Hillsdon & Thorogood, 1996). Factors that have not contributed to success in physical activity interventions include relapse prevention and reinforcement programs (Marcus & Stanton, 1993). Providing written materials (Pfieffer et al., 2001; Smith et al., 2000; Swinburn et al., 1998) and telephone counselling (Calfas et al., 2002; Green et al., 2002) have had mixed results. Injury appears to be the only factor specifically associated with exercise relapse (Sallis et al., 1990).

Tulloch et al. (2006) have reviewed studies of physical activity counselling in primary care and found that 37% of interventions were conducted solely by GPs,

37% by allied health professionals, and 26% used a combination of providers. Over time, there has been a shift towards fewer GP delivered interventions and more allied health professional delivered interventions. While increases in physical activity behaviour occurred across all provider categories, those delivered by allied health professionals had the greatest long-term (> 6 month) benefit.

Of the few dietary interventions that have been conducted in primary care settings, most have been conducted by GPs or practice nurses. The need for dietitians to play an integral role in nutrition education has not been substantiated. Dietary advice was equally effective in reducing cholesterol when given by a dietitian, a practice nurse or a diet leaflet alone (Neil et al., 1995), and while dietitians were better than doctors at lowering cholesterol in the short to medium term, they were not more effective than self-help resources (Thompson et al., 2003).

It remains to be seen whether a tailored intervention provided by a DEP in primary care could be more efficacious than those provided by GPs, practice nurses, and separate dietitians and exercise physiologists. Motivational interviewing has been recommended in the treatment of obesity (Rollnick, 1996) and is well-suited to primary care to improve patient compliance (Scales & Miller, 2003), but has not been commonly used in previous nutrition or physical activity interventions.

#### 1.4.4 Counselling strategies used in lifestyle interventions

##### *1.4.4.1 Motivational interviewing*

Motivational interviewing was initially used in the treatment of problem drinkers (Miller, 1983). Since this time, its use has been expanded to other aspects of health including drug use, compliance with medical advice, and lifestyle behaviour change. Rollnick and Miller (1995, p. 326) define motivational interviewing as “a directive, client-centred counselling style for eliciting behaviour change by helping clients to explore and resolve ambivalence”. They note that it is a focused and goal-directed form of counselling with a central purpose of examining and resolving



ambivalence. Rollnick and Miller (1995, p. 326-327) provide seven statements that describe the spirit of motivational interviewing:

1. "Motivation to change is elicited from the client, and not imposed from without."
2. "It is the client's task, not the counsellor's, to articulate and resolve his or her ambivalence."
3. "Direct persuasion is not an effective method for resolving ambivalence."
4. "The counselling style is generally a quiet and eliciting one."
5. "The counsellor is directive in helping the client to examine and resolve ambivalence."
6. "Readiness to change is not a client trait, but a fluctuating product of interpersonal interaction (whereby resistance and denial are seen not as client traits, but as feedback regarding therapist behaviour)."
7. "The therapeutic relationship is more like a partnership or companionship than expert/recipient roles."

They later go on to contrast the fundamental approach of motivational interviewing as incorporating collaboration, evocation and autonomy, in contrast to confrontation, education and authority (Miller & Rollnick, 2002).

Rollnick and Miller (1995, p. 327-328) list five therapist behaviours that are characteristic of a motivational interviewing style:

1. "Seeking to understand the person's frame of reference, particularly via reflective listening."
2. "Expressing acceptance and affirmation."

3. "Eliciting and selectively reinforcing the client's own self motivational statements – expression of problem recognition, concern, desire and intention to change, and ability to change."
4. "Monitoring the client's degree of readiness to change, and ensuring that resistance is not generated by jumping ahead of the client."
5. "Affirming the client's freedom of choice and self-direction."

There are four general principles that underpin motivational interviewing (Miller & Rollnick, 2002):

1. Express empathy.
  - a. Acceptance facilitates change.
  - b. Skilful reflective listening is fundamental.
  - c. Ambivalence is normal.
2. Develop discrepancy.
  - a. The client rather than the counsellor should present the arguments for change.
  - b. Change is motivated by a perceived discrepancy between present behaviour and important personal goals or values.
3. Roll with resistance.
  - a. Avoid arguing for change.
  - b. Resistance is not directly opposed.
  - c. New perspectives are invited but not imposed.
  - d. The client is a primary resource in finding answers and solutions.
  - e. Resistance is a signal to respond differently.
4. Support self-efficacy.
  - a. A person's belief in the possibility of change is an important motivator.

- b. The client, not the counsellor, is responsible for choosing and carrying out change.
- c. The counsellor's own belief in the person's ability to change becomes a self-fulfilling prophecy.

Motivational interviewing is informed in part by the transtheoretical model (DiClemente & Prochaska, 1985), in which behaviour change is believed to involve a process that occurs in increments. The stages of change proposed by this model include:

1. Initial precontemplation – not currently considering change
2. Contemplation – serious evaluation of considerations for or against change
3. Preparation – planning and commitment are secured
4. Action to make the behaviour change
5. Maintenance to sustain long-term change

DiClemente and Velasquez (2002) suggest that different counselling styles should be used with patients at different stages of change in the transtheoretical model, and that this may be facilitated through the use of motivational interviewing.

Anstiss (2009) lists several benefits of adopting motivational interviewing in practice in primary care. He suggests that motivational interviewing can help health care systems to deliver integrated care by developing active, informed patients, and building more integrated teams. It can help clinicians to integrate evidence-based medicine with patient centred care, physical and mental healthcare, and clinical care and self-care.

To test the use of motivational interviewing amongst 11 trained exercise professionals, consultations were recorded both prior to training and six months after training (Moore, Moore and Murphy, 2011). Seven demonstrated increased use of motivational interviewing in practice, and four scored lower. Those who did not adopt a motivational interviewing approach commented that it was too difficult

to combine motivational interviewing with structured data collection, or that it was unnecessary because patients were already motivated or ready to change. It was concluded that clinicians' unwillingness to adopt a motivational interviewing spirit presents a strong barrier to the use of motivational interviewing in primary care.

VanWormer and Boucher (2004) identified five studies that used a motivational interviewing approach to elicit dietary modification. The studies demonstrated a reduction in fat and sodium intake, and an increase in fruit and vegetable consumption. Motivational interviewing was found to be useful, but did not provide greater treatment benefit than standard practice or controls.

A meta-analysis was conducted of 72 randomised controlled trials that used motivational interviewing as the intervention (Rubacket al., 2005). They found a significant and clinically relevant effect in 75% of studies, and motivational interviewing was found to be equally effective for both physiological and psychological conditions. The effects of motivational interviewing were greater when conducted by psychologist and GPs (80%) rather than other healthcare providers (46%). This may reflect differences in the relationship between patients and clinicians. For example, they may have a longer standing and more trusting relationship with their GP than a new allied health professional, and a greater duration and number of encounters with psychologists.

#### *1.4.4.2 Activity scheduling and homework*

Activity scheduling is a behavioural treatment often used for depression that aims to increase the number of pleasant activities and interactions of patients with their environment (Cuipers et al., 2007). Homework assignments are a specific type of activity scheduling designed to change client behaviour in the absence of therapist supervision (Shelton & Levy, 1979). Homework is known to be used in practice by most psychologists (Kazantzis & Deane, 1999). Kazantzis et al. (2000) conducted a meta-analysis of 27 studies using homework assignments, and found that homework assignments produced significant positive effects on therapy outcome, and that homework compliance is a significant predictor of therapy outcome.

Cuijpers et al. (2007) later conducted a meta-analysis of activity scheduling in 16 studies and found that activity scheduling generally had a greater effect than other psychological treatments, and similar effectiveness to cognitive therapy.

Both motivational interviewing and activity scheduling have been demonstrated to enhance outcomes in psychotherapy. There is also evidence to support the use of motivational interviewing by other health professionals. These counselling methods will be applied in the delivery of the lifestyle intervention described in Chapter 3. This is a novel application of the use of homework in consultation with DEPs to improve both physical lifestyle behaviours and mental health outcomes.

## **1.5 Study Plan**

### **1.5.1 Justification**

Patients with mental illness are believed to be unfit, inactive and poorly nourished. There is a growing body of evidence to support the benefits of nutrition and physical activity interventions for patients with mental illness. Despite this evidence, neither nutrition nor physical activity counselling were recommended in the most recent guidelines for the treatment of depression in Australia and New Zealand (Ellis et al., 2004).

At least one third of patients in Australian primary care present with mental illness. General practitioners (GPs) are in a good position to provide nutrition and physical activity counselling to patients with mental illness because they have developed a rapport with their patients, and the patients have developed strategies to attend appointments at the practice including arranging transportation, childcare, and time away from employment as required. Unfortunately, lifestyle interventions delivered by GPs have not been generally successful. Dietitian and exercise physiologists (DEPs) are trained to provide evidence based, individually tailored nutrition and physical activity programs and have the potential to successfully deliver such programs. The role and potential effectiveness of DEPs in primary care has yet to be explored.

### 1.5.2 Study Aim

The primary aim of the this study was to determine whether counselling from a dietitian and exercise physiologist in primary care could improve recovery (mental health outcomes) of patients with depression and anxiety and would be an feasible and sustainable mode of treatment for clients and referring doctors. A secondary aim was to measure and describe the nutritional intake and physical fitness of participants at baseline and on completion of the intervention. The intervention involved tailored counselling rather than a specific prescribed nutrition or exercise program, as this best resembles standard practice.

### 1.5.3 Experimental hypotheses

1. Patients with depression and anxiety have a lower intake of core food groups, and key nutrients (calcium, iron and folate) than the general Australian population as measured with the Diet History Interview, and compared to intakes measured in the National Nutrition Survey.
2. Patients with depression and anxiety are less fit than the general Australian population as measured by the YMCA step test, chair stand test and arm curl test and compared to Australian adult norms.
3. Patients with depression and anxiety are less physically active than the general Australian population as measured by the Active Australia Survey and compared to Australian adult norms.
4. Patients receiving counselling from a dietitian and exercise physiologist will have greater reductions in depression and anxiety than patients receiving usual GP care only as measured by the Depression, Anxiety and Stress Scale (DASS).
5. Key stakeholders (patients, doctors) will view counselling from a dietitian and exercise physiologist as a feasible and sustainable intervention as documented by qualitative interviews and questionnaires.

## CHAPTER 2 METHODOLOGY<sup>1</sup>

### 2.1 Overview and description of the program

The study was part of the Australian Integrated Mental Health Initiative (AIMhi) which is a 5-year National Health and Medical Research Council funded program aimed at improving recovery from mental illness. The clinicians who conducted the lifestyle interventions as part of the study were dually qualified and accredited as dietitians and exercise physiologists. The University of Wollongong provides specialized training that allows students graduating at the Masters level to qualify for accreditation as both dietitians and exercise physiologists. The lifestyle intervention was designed in light of the current Australian health care environment. The Enhanced Primary Care Scheme (Newland & Zwar, 2006) was initiated in 2005 with rebates for up to five annual visits to allied health professionals including dietitians for patients with chronic and complex conditions. Exercise physiologists were included in the group of eligible allied health professionals in 2006. The dually qualified dietitians and exercise physiologists (DEPs) are in an ideal position to provide such services as they can divide the five visits between diet and exercise interventions depending on the patient's readiness to change lifestyle behaviours.

The present study was conducted in association with the Illawarra Division of General Practice (IDGP). Divisions of general practice represent primary care networks in Australia. The IDGP has approximately 250 general medical practitioner (GP) members representing around 85% of all GPs in the region. The

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<sup>1</sup> A portion of this chapter has been published in the following peer reviewed article:

Forsyth, A., Deane, F.P. and Williams, P. (2009). Dietitians and exercise physiologists in primary care. *Journal of Allied Health*, 38, e63-e68.

AF was responsible for the preparation and critical discussions of the manuscript. FPD and PW were responsible for critical discussions of the manuscript.

division runs several programs for patients with mental illness and has provided training for their GPs in the assessment and management of mental health problems for many years (e.g., Marshall & Deane, 2004). There was anecdotal evidence that many of the patients who were being treated for mental health problems in general practice also had comorbid physical health conditions that appeared amenable to lifestyle interventions. These anecdotal observations are also supported by research that suggests a strong link between mental illness and physical conditions including cancer, cardiovascular disease and obesity (Balon, 2006). It has been demonstrated that patients with physical illness who have comorbid depression are approximately twice as likely to utilize health care, have functional disability and be absent from work (Stein et al., 2006).

This study was carried out in two parts: a pilot study to assess the feasibility of implementing the program in primary care and a larger study to assess the effectiveness of such a program in improving mental health outcomes. The model was altered slightly after evaluation of the pilot program (to be discussed further on). Both the pilot and main study required referral from a GP. Inclusion criteria were purposely minimal in order to keep the study as naturalistic as possible. Eligible patients needed to be aged 18 years or older and to be treated for depression or anxiety. Specific diagnostic criteria were not required because many GPs do not use these formalised diagnostic interviews to diagnose or evaluate mental illness (Verhaak et al., 2006). Patients were excluded if they had conditions contraindicating exercise or insufficient mental capacity to follow simple instructions. Table 2-1 provides an outline of the program protocols.

**Table 2-1 Summary of the program protocol**

1. Referral from GP. Inclusion criteria: > 18 years of age, being treated for depression or anxiety.
2. Referral faxed to DEP.
3. DEP contacted patients to book appointments.
4. Initial assessment (week 1).



- a. Obtained informed consent.
  - b. Completed questionnaires.
  - c. Medical, weight and exercise history.
  - d. Detailed diet history interview.
  - e. Physical measurements (see assessment tools in Table 3-1).
  - f. Provided schedule of upcoming appointments.
5. Four consultations (around weeks 2, 4, 6, and 10).
- a. Motivational interviewing
  - b. Goal-based approach
  - c. Individually tailored programs
  - d. Homework
  - e. Tools used to address barriers to change and enhance motivation and compliance
6. Review assessment (week 12).

## **2.2 Experimental design**

The study employed a randomized parallel design. Patients were randomly assigned to either an intervention or an attention control group according to a randomisation chart generated by <http://www.randomization.com> to match participant groups for treating GP. For each GP, patients were randomly allocated to each condition to evenly represent within-GP effects across conditions. Randomisation, group assignment and participant enrolment was conducted by the primary researcher, with other DEPs following the randomisation protocol. Neither patients nor GPs were blind to their condition due to the naturalistic nature of this study. It was not practical to blind GPs or patients without deception or the creation of a believably equivalent control condition.

Half of the patients participated in the three-month intervention immediately after referral, and half of the patients were assigned to a three-month waitlist and attention control prior to receiving the three-month intervention. During the control period, participants undertook baseline assessments, had fortnightly telephone contact with the DEP and received usual GP care. This form of control has been used in large scale studies such as the Finnish Diabetes Prevention Study (Lindstrom et al., 2003). The telephone contact allowed the DEP to inquire about the patients' progress, but did not provide any advice or specific suggestions to support the patient in making lifestyle change. In the intervention period, participants undertook assessments at baseline, completion (three-months) and follow-up (six-months), received usual GP care, and attended four appointments (one 60-minute initial consultation, and three 30-minute review consultations) with the DEP. Appointments were scheduled approximately fortnightly, with a total of six assessments and consultations in a three-month period.

### **2.3 Participants**

Patients were excluded if they had physical conditions that were contraindicated for exercise, as determined by their GP, including:

- Uncontrolled hypertension (eg BP 180/110)
- Recent onset/unstable angina pectoris
- Recent unexplained or uninvestigated chest pain or exertional dyspnoea
- Aortic stenosis or uninvestigated systolic murmurs
- Age < 18 years
- Moderate or severe CCF
- Postural hypotension >20mmHg
- Uncontrolled arrhythmia
- Uncontrolled sinus tachycardia (>120 beats/min)
- 3<sup>o</sup> heart block (without pacemaker)

- Active pericarditis or myocarditis
- Myocardial infarction or coronary intervention (eg stenting or CABG < 6mths)
- Cardiomyopathy – suggest inclusion only on consultation with cardiologist
- Other pacemaker or valve replacement patients – on advice of cardiologist only
- End-stage renal failure
- Acute systemic illness or fever
- Recent pulmonary embolism (<6mths since diagnosis)
- Thrombophlebitis
- Uncontrolled diabetes (random BSL's consistently >20)
- Orthopaedic conditions that would prohibit exercise
- Metabolic disorders eg acute thyroiditis, hypokalaemia, hypovolaemia, hyperkalaemia
- Organ transplant recipients
- Stroke or TIA <3 mths ago
- Insufficient mental capacity to follow instructions

These exclusion criteria have been successfully used by a study providing a physical activity intervention to primary care patients with diabetes in the Illawarra, NSW region (IDGP, 2004).

## **2.4 Program Promotion and Recruitment**

As a naturalistic study, all GPs in the Illawarra (approximately 250 in total) were invited to participate and participation was voluntary. Thirty-four GPs referred patients to participate in the study. Of these, 20 GPs referred only one patient, nine GPs referred at least five patients, and four GPs referred at least 10 patients.

Recruitment via GP can be a challenging endeavour and required the use of multiple strategies. To optimise recruitment, DEPs gave presentations at GP

meetings prior to commencing the study, on study commencement, and regularly throughout the study. These meetings were organized by the IDGP and were held after hours. There were incentives for GPs to attend in the form of continuing education points, meals on the night, and collegial interactions with other local GPs. The initial presentations (see Appendix A) were about 40 minutes in length, providing background information on nutrition, exercise and their associations with mental health, as well as information on the proposed study. Subsequent presentations were five minute reminders that updated GPs on the study and encouraged further referrals.

Individual meetings were organized with GPs who expressed interest in participation and their practice staff as needed. Program information was distributed regularly through IDGP newsletters. To ease the referral process, the referral was limited to a one-sided page that could be faxed or mailed to the DEP who would then make arrangements with the patients (see Appendix L). Referral templates were also included on the IDGP website and medical software packages (Medical Director and Profile).

Recruitment via GPs required persistence, with most GPs referring only after several meetings, or where there was a very strong belief in the effectiveness of lifestyle interventions or a pre-existing referral relationship. The GPs referring the greatest number of patients were actively involved in the IDGP, operated out of medium to large modern practices, and regularly referred patients to dietitians, exercise physiologists and other allied health professionals.

Activities undertaken to recruit GPs and prompt referrals include:

1. Presenting to GPs at educational events prior to study commencement. At this visit GPs were provided with information sheets and reference lists. GPs were asked to complete a brief questionnaire assessing their knowledge and interest in diet and exercise for mental illness as well as their previous participation in other IDGP programs (see Appendix A).

2. Individual meetings with GPs when ready to accept referrals. Interest forms and referral forms were provided in packages for GPs.
3. Including GP information and expressions of interest in the GP newsletter for GPs to fax in if interested.
4. Where requested and/or indicated, meetings with GP or practice staff.
5. Continued presentations to GPs to update on results and distribute referral packages.
6. Writing to all participating and interested GPs informing them of the start of the main study. Additional referral forms were provided.
7. Preparing a press release for mental health week. As a result the study gained publicity on three local radio stations and one associated website.
8. Regular short updates in GP newsletters and e-mails.
9. Providing study information to practice nurses attending mental health education events.

## **2.5 Location and frequency of contact**

Once referred, patients were eligible for six visits to the DEP, based on the five Enhanced Primary Care Scheme visits plus one extra assessment for research purposes. These visits included an initial assessment, four consultations and a final assessment. Visits were initially scheduled monthly, but altered for the main study to a more frequent schedule of at least fortnightly for the first three to four visits to enhance patient compliance and reduce attrition. Clinics were initially planned to be held exclusively in the primary care environment, that is, at GP surgeries. A half-day clinic held weekly or fortnightly at each surgery was generally sufficient to accommodate all patients referred. Holding clinics within the GP's rooms was convenient for most patients, especially those not residing or working in the city centre. However, many GPs had very busy rooms and preferred to refer patients

outside of the practice. For the main study, consulting rooms at the Northfields Psychology Clinic on the University of Wollongong campus were made available to participants whose GPs did not have consulting rooms available, or for participants who preferred to travel to the University of Wollongong campus.

## **2.6 Assessment Schedules**

The initial assessments were conducted by the candidate, assisted by a research assistant or a trained final year nutrition and exercise science student. Where possible, subsequent assessments were conducted by an alternate researcher or research student to prevent bias. The assessment was scheduled for 90 minutes and included five stages with 12 assessment tools as described in Table 2-2. The same assessment was conducted at baseline and post-test (three months). Data from control group participants completing the delayed intervention protocol was collected but not analysed for the purpose of this thesis. All participants who completed the program were also invited to a follow up assessment six months after completion of the program. The follow up assessment was scheduled for 120 minutes as this also included a semi-structured interview to obtain participant feedback regarding the program.

**Table 2-2 Summary of the assessment protocol**

Key activities	Tools Used	Domain	Purpose	Time (min)
Familiarize patient with study.  Obtain informed consent.	Informed consent form		To ensure that the patient understands the nature of the program and is a willing participant.	10
Ensure self-report questionnaires have been completed.	Depression Anxiety and Stress Scale (21-items) (Lovibond & Lovibond, 1995)	Depression, anxiety and stress symptoms	To determine the effectiveness of diet and exercise counselling on mental health, health behaviours and substance use.	1
	Active Australia Survey (13-items) (Brown et al., 2004)	Time spent in physical activity and sedentary behaviours		
	AUDIT and Severity of Dependence Scale (15-items) (Saunders et al., 1993)	Alcohol use		
	Recovery Assessment Scale (41-items) (Corrigan et al., 1999; Corrigan et al., 2004)	Personal confidence and hope, willingness to ask for help, goal and success orientated, rely on others, not dominated by symptoms		
	Brief Diet Survey (8-items) (Spencer et al., 2005)	Dietary intake		

Key activities	Tools Used	Domain	Purpose	Time (min)
Obtain patient's medical (including mental health), weight and exercise history.			To inform diet and exercise programs.	20
Complete a detailed diet history interview.	Diet History Questionnaire (Martin et al. 2003)	Detailed computerised nutrient analysis using Xyris Foodworks software program version 3.1 (Highgate Hill, Brisbane Australia)  Calculation of the Healthy Eating Index (Weinstein et al., 2004)	To obtain detailed dietary data to inform diet programs and to evaluate changes pre- and post-treatment.	30
Obtain physical measurements.	Blood pressure  Resting heart rate  Height  Weight  Waist circumference   Arm curls  Chair stands (Rickli & Jones, 1999)   YMCA step test (Golding et al., 1989)	Muscular endurance       Aerobic fitness	To obtain measurements of health and fitness to inform diet and exercise programs and to evaluate changes pre- and post-treatment.	10



## **2.7 Assessment methods**

The assessments used were categorized into physical activity, diet and mental health, and described below. Only measures that have been previously found to be valid and reliable were used in this study. Measures were also selected based on the availability of normative data. Fitness tests were selected based on the portability of equipment, the ability to be performed in limited space, and breadth and sensitivity of tests to be able detect change in participants with a wide range of fitness levels.

### **2.7.1 Physical Activity**

The Active Australia Survey (Australian Sports Commission, 1998) is composed of two sections. The first asks participants to record the number of occasions and total number of minutes over the past week that they have spent in each of (1) continuous walking, (2) vigorous physical activity and (3) moderate physical activity. The second section asks participants to estimate the total time spent in sedentary recreation on (1) weekdays and (2) weekend days over the past week. This has been found to be a valid (71.8% agreement with other surveys) and reliable (intra-class correlation 0.64) instrument to measure self-reported physical activity (Brown et al., 2004).

### **2.7.2 Fitness**

#### ***2.7.2.1 Chair Stand Test***

The chair stand test and arm curl test from the Senior's Fitness Battery (Rikli & Jones, 1999) were selected to measure upper and lower limb muscular endurance. These tests measure the number of arm curls or repeated standing from a chair over 30 seconds. Despite being intended for use with seniors, these tests were chosen due to their portability and reliability. While their validity has not been widely demonstrated in young adults, in the present study the assessment appears sensitive enough to detect significant changes over time including amongst fit, young individuals.

Participants were seated in a straight-backed chair without arms. The chair was placed against the wall to prevent movement. Participants were instructed to sit with their knees and hips at 90 degree angles, and to cross their arms across their chest. They were then advised to rise to a full stand and return to the seated position. After a demonstration and one practice, participants were timed completing as many chair stands as possible in 30 seconds. The results were compared to gender and age specific norms (Rikli & Jones, 1999b) to generate muscular endurance ratings of well below average, below average, average, above average or well above average. For participants aged under 60, their results were compared with the youngest available norms. The chair stand test has been demonstrated to be both reliable (intraclass correlation  $R = .89$ ) and valid ( $r = .77$ , compared to 1 RM leg press gold standard) (Rikli & Jones, 1999).

#### *2.7.2.2 Arm Curl Test*

Participants were seated in a straight-backed chair without arms. The chair was placed against the wall to prevent movement. A 3.5 kg dumbbell was provided for men, and a 2 kg dumbbell was provided for women. Participants were seated comfortably in the chair with their feet on the floor. The dumbbell was provided for the dominant hand. Participants were instructed to place their arm in elbow extension along the side of the torso, with their wrists in a neutral position. Participants were then asked to supinate the wrist while curling the arm in to the full range of flexion, then extend back to the starting position. After a demonstration and one practice, participants were timed completing as many arm curls as possible in 30 seconds. The results were compared to gender and age specific norms (Rikli & Jones, 1999b) to generate muscular endurance ratings of well below average, below average, average, above average or well above average. For participants aged under 60 years, their results were compared with the youngest available norms. The arm curl test has also been found to be both reliable (intraclass correlation  $R = .81$ ) and valid ( $r = .78$ , compared to combined 1 RM chest press, biceps and upper back gold standard) (Rikli & Jones, 1999).

### 2.7.2.3 YMCA Step Test

The YMCA step test (Golding, 2000) was chosen as a measure of aerobic fitness because it is a portable measure with good validity and reliability. This test involves stepping 30 cm at a cadence of 96 beats per minute (or equivalent to 24 complete steps each minute) for three minutes. Despite concerns that a step test may pose limitations for patients with musculoskeletal problems such as arthritis, this test was widely accepted amongst study patients in the pilot program. Even patients with joint problems and very poor fitness did not demonstrate excessive anxiety regarding step tests and were able to complete a three-minute stepping exercise.

Post-test heart rate is taken between 5 and 20 seconds following completion of the test, and compared to gender and age specific norms to generate an aerobic fitness rating of very poor, poor, below average, average, above average, good or excellent. The YMCA step test (also known as the Kasch step test) has been demonstrated to have acceptable reliability and validity compared to treadmill testing ( $r = 0.95$ ) (Kasch et al., 1966).

## 2.7.3 Anthropometry and physical assessments

### 2.7.3.1 Blood pressure

Blood pressure was taken using an automatic measurement unit (Omron model HEM-711AC). This measurement was taken following the interview and diet history, and prior to the fitness assessment, to ensure that a resting measurement was obtained. The cuff was placed on the upper right arm with the forearm resting and palm facing up. The measurement was read from the Omron. If there was an error in obtaining a measurement, or if the measurement was high enough to preclude exercise, a repeat measurement was taken five minutes later. The Omron HEM-711AC has been demonstrated to improve precisions without leading to changes in mean recorded blood pressure relative to mercury sphygmomanometers in general practice settings (McManus et al., 2003).

### 2.7.3.2 Height

Participants were asked to stand on a stadiometer barefoot and with a neutral posture. The headpiece was placed at the highest point on the head and height measurement was read at eye level to the nearest one mm.

### 2.7.3.3 Weight / Body Mass Index

The scales were placed on a flat, hard surface. Weight was measured with participants standing on the scales in bare feet and light clothing. Body Mass Index (BMI) was calculated by dividing weight in kilograms by height in metres squared. A BMI of 18 – 24.9 kg m<sup>-2</sup> was considered to be within a healthy weight range.

### 2.7.3.4 Waist

Waist girth was measured at the level of the noticeable waist narrowing using a flexible metal tape. In participants without a noticeable waist narrowing, an arbitrary waist measurement was made approximately half way between the costal border and the iliac crest. The tape was wrapped around the abdomen, with care taken to ensure that the tape was level at the sides and back. The waist measure was read to the nearest one mm.

## 2.7.4 Nutrient intake and diet quality

A detailed diet history interview was conducted using a Diet History Questionnaire (a detailed history of the usual foods consumed at each meal and snack, and a food frequency questionnaire). This questionnaire has been previously shown to accurately estimate macronutrient and energy intakes in healthy Australians, and to perform well relative to a weighed three day food record (Martin et al., 2003). Dietary data was also assessed against current dietary guidelines using the Australian Modified Healthy Eating Index (Throw, 2007).

The diet history questionnaire (Martin et al., 2003) was used to collect information about usual dietary practices. Participants were asked to describe all foods consumed in a typical week. They were asked to account for all breakfast foods,

lunch foods, dinner foods and snack foods. Participants were asked open ended questions regarding their intake for each meal, with more specific follow-up questions asking about quantity and frequency of consumption, and prompting recall of associated items such as beverages, spreads and seasonings. A list of commonly consumed foods was listed at the end of the questionnaire. This served as a prompt to capture the intake of any foods not previously recalled. Dietary intake was analysed for energy and micronutrient intake by daily intake and as a percentage of the estimated average requirements (EAR) (Department of Health and Ageing, 2006) using the Xyris Foodworks software program version 3.1 (Highgate Hill, Brisbane Australia), which is based on the Australian Nutrient Database (AUSNUT 2000, Department of Human Services and Health, Canberra). The Australian Modified Healthy Eating Index (Aust-HEI) (Throw, 2007) was applied to the information collected in the diet histories. This index rates how well diets conform with national dietary guidelines to obtain a rating score out of 60. Participants were provided with a basic analysis of their intake, displaying intake of nutrients as a percentage of recommended intakes, and during their consultations were offered the opportunity to discuss their results including suggested dietary improvements.

## 2.7.5 Mental health

### 2.7.5.1 DASS

The Depression, Anxiety and Stress Scale (DASS-21) (Lovibond & Lovibond, 1995) was selected for its brevity, mobility, low cost and the availability of normative data. It is also a measure that differentiates relatively well between symptoms associated with depression and anxiety. A high level of internal reliability of the DASS has been determined with Cronbach's alpha of 0.96 for depression, 0.89 for anxiety and 0.93 for stress (Brown et al., 1997). Validity was measured relative to several other commonly used measures of depression and anxiety. Significant correlations were found between the depression subscale and other measures of depression, and between the anxiety and stress subscales and other

measures of anxiety (Brown et al., 1997). It was also known by the study team that the DASS-21 was commonly used by referring GPs.

The short form of the DASS has 21 items, comprises three subscales measuring the negative emotional states of depression, anxiety and stress (Lovibond & Lovibond, 1995). Participants rate the extent to which they have experienced the emotional states over the past week using a 4-point Likert scale ranging from 'Did not apply to me at all' to 'Applied to me very much, or most of the time'. A total score is produced with higher scores indicating higher levels of symptom distress.

## 2.7.6 Key stakeholder feedback

### 2.7.6.1 GP questionnaires

At the conclusion of the program, GPs were sent a brief questionnaire (see Appendix N) to provide feedback on the program. The questionnaire was composed of eight multiple choice questions to determine whether GPs felt the program was relevant and of benefit for patients' mental and physical health. It also assessed GPs preferred modes of referral and rate and volume of feedback.

### 2.7.6.2 Participant interviews

All participants were invited to complete a semi-structured interview after completion of the program (see Appendix M). The interview was designed to determine participants' motivations for participating in the program, their challenges and achievements during the program, aspects that they appreciated or would change about the program, and their plans following the conclusion of the program.

## 2.7.7 Other questionnaires

Questionnaires used in the assessment but not analysed for the purpose of this thesis include:

- Brief Diet Survey (Spencer et al., 2005) (as used by QLD Health in the AusDiab study)\*,

- Used to collect information on general dietary patterns
- Brief General Health Survey (as used in the University of Queensland AIMhi study)\*,
  - Used to collect information on health monitoring by GP
- Confidence to Manage Health Behaviours (as used in the University of Queensland AIMhi study)\*,
  - Used to assess self-efficacy for health behaviours (including diet and exercise behaviours)
- Recovery Assessment Scale (RAS) (Corrigan et al., 2004)\*,
  - Used to assess recovery from mental illness
- AUDIT (Saunders et al., 1993)\*.
  - Used to specify and quantify alcohol use

## **2.8 Interventions**

Consultations were scheduled for 60 minutes (initial) or 30 minutes (review). Initial consultations typically lasted 45 to 60 minutes and review consultations lasted anywhere from 15 to 40 minutes. A motivational interviewing approach was used in consultations to enhance patient engagement and adherence (Rollnick, 1996). A goal-based approach was used in determining patient programs with programs individually tailored according to patient readiness to change for diet and exercise behaviours (Prochaska & DiClemente, 1982). All dietary and physical activity changes were client-driven, and designed to be sustainable, affordable, progressive, suitable to the participant's lifestyle, and able to be performed without professional supervision. All nutrition and physical activity advice was primarily based on the Australian Guide to Healthy Eating (Smith, 1998) and the Physical Activity Guidelines for Australian Adults (Department of Health and Ageing, 2004). This study did not provide a specific nutrition or physical activity intervention, rather it followed the individualised approach of a recent large diabetes prevention

program that stated: *‘Our lifestyle intervention was systematic and intensive, with the study participants receiving detailed, individualized counseling. The study, however, was not designed to test the relative contributions of dietary changes, increased physical activity, and weight loss to the reduction in the risk of diabetes, and the effects of these components remain to be determined’* (Diabetes Prevention Program Research Group, 2002).

Homework was written on a standard form (see Appendix H) at the end of each session and assessed at the start of the subsequent session (Kazantzis et al., 2000). Homework has been used increasingly in the treatment of mental illness (Kazantzis et al., 2000), and a meta-analysis has found that scheduling daily activity is as effective as cognitive therapy and other psychological interventions at improving depressive symptoms (Cuijpers et al., 2007). Thus the use of systematic therapeutic homework administration procedures is a key component of the intervention.

In this program homework was found to be helpful as it clarified goals and tasks for participants, and could be used to record and monitor performance. Specific items included in the homework sheet were a description of the homework activity, relevant goals, how often, when, how long and where homework was to be performed, and a confidence rating (Kazantzis et al., 2005). Several tools including a decisional balance matrix (Prochaska et al., 1994) were utilized to address barriers to change and enhance motivation and compliance. The decisional balance matrix, or motivational enhancement worksheet (see Appendix J), is a tool in which clients identify benefits and costs of current and proposed behaviours with the aim of resolving ambivalence and enhancing motivation for behaviour change.

## **2.9 Ethics and data analysis**

All studies conducted as part of this research were reviewed and approved by the University of Wollongong Human Research Ethics Committee.



Descriptions of specific strategies and statistical methods used to analyse the data collected can be found in each of the subsequent chapters.

## **2.10 Study development and reporting**

This study was conducted according to the Medical Research Council (MRC) framework for conducting trials of complex interventions (Craig et al., 2008), and reported according to the CONSORT guidelines (Moher et al., 2010; Schulz et al., 2010). The MRC framework guides researchers through the steps of developing a complex intervention, piloting and feasibility, evaluating the intervention, reporting and implementation. Developing the intervention involves identifying existing evidence, and identifying and developing theory. Existing evidence and theories have been outlined in Chapter 1 of this thesis. A full pilot study was conducted, with subsequent modifications described in Chapter 3. Preferred methods to minimise bias including individual randomisation were used. As recommended, one primary measure (DASS scores) and a small number of secondary outcomes (nutrient intake, diet quality, anthropometry, fitness and physical activity) were measured and reported in chapter 5. A process evaluation was undertaken and described in detail in chapter 3. The results have been reported in chapter 5 in the context of a systematic review of the related literature. Chapters 4, 5 and 6 each present clearly described recommendations that can be implemented in practice.

## **CHAPTER 3 FEASIBILITY OF A PRIMARY CARE LIFESTYLE INTERVENTION FOR PATIENTS WITH DEPRESSION AND ANXIETY**

### **3.1 Introduction**

One aim of this study was to evaluate the feasibility of providing a lifestyle intervention delivered by dually qualified DEPs in a primary care setting for patients being treated for depression and/or anxiety. The intervention was composed of two assessments and four consultations over 12 weeks. This model of delivery was selected as a sustainable model based on the Enhanced Primary Care Scheme (Newland & Zwar, 2006) which provides five rebated visits to allied health professionals annually for patients with chronic illness. Patients were referred by their GP and randomly assigned to either immediate treatment or delayed treatment with a three month attention control. Those in the attention control were contacted by telephone to monitor progress only. Participants were assigned a DEP and saw the same practitioner throughout their program. Consultations utilised motivational interviewing and homework to engage participants and assist in developing individually tailored lifestyle behaviour modifications.

This chapter describes the interview and survey data collected from key stakeholders including GPs and participants.

### **3.2 Changes to the program structure**

Prior to recruiting participants for the main study, a pilot study was conducted with 25 referred patients to evaluate the model and implement improvements. Initially, the consultations were spread over six months, with approximately one month between visits. This was altered to more frequent visits over three months to enhance patient compliance and reduce attrition. Initially, all consultations and assessments were held in GP surgeries only, however both GPs and patients often preferred for the clinics to be held in rooms at the University of Wollongong campus, and this became the preferred option for most participants in the main study.

### **3.3 Feedback from GPs**

At the conclusion of the program, GPs were sent a brief questionnaire (see Appendix N) to provide feedback on the program. GP feedback was sought using the brief questionnaire with Likert scale questions to maximise the response rate from busy GPs. The questionnaire was reviewed by all participating DEPs as well as university nutrition and psychology academics before being sent to participating GPs. Ten out of 37 referring GPs returned the survey (see compilation of individual responses in Appendix N). In total, these GPs had referred 58 patients, which accounted for 46% of the total number of referrals. Three of the responding GPs had referred 11 patients each, while two of the responding GPs had each only referred one patient who did not complete the study protocol. Those GPs who had made only one referral were the only GPs to provide negative feedback via their responses to the survey questions. All other GPs reported that the program was appropriate for many (7/10) or all (1/10) of their patients and that the quality of services provided was good (4/10) or very good (5/10). Most GPs (8/10) felt that the program had a positive impact on both their patients' mental and physical health, and that they received feedback at an appropriate rate and volume. Nine of the 10 GPs indicated that referral to the program was "easy" and all responding GPs used the paper referral forms.

### **3.4 Feedback from patients**

All patients were invited to complete a 3-month follow up including a semi-structured interview (see Appendix M). Interviews have been identified as the most appropriate method of collecting data about participants' thought, feelings and beliefs (Draper & Smith, 2010). The semi-structured interview questions were reviewed by all participating DEPs as well as university nutrition and psychology academics. Six patients attended for follow-up three months after the completion of the program and completed the interview then. Ten patients completed an interview at their final assessment at 12 weeks due to the lack of time for subsequent follow-up. In total, 16 participants completed an interview. Due to the small number of interviews and the relatively brief nature of the responses, all of

the responses have been compiled in Appendix M. Using interpretive coding (Fade & Swift, 2010), interview responses have been grouped and are presented below.

#### 3.4.1 Referrals and reasons for participation

Thirteen (81.3%) respondents found out about the program from their GP. Another two (12.5%) were recommended by their psychiatrist, and one (6.3%) saw a pamphlet on his psychologists' desk. Respondents decided to participate because they wanted to achieve weight loss (25%), improve fitness or physical health (25%), improve mental health (37.5%), follow doctors' orders (6.3%) or participate in research (6.3%).

#### 3.4.2 Expectations and early observations about the program

Eleven respondents reported an expectation that the program would assist with weight loss or fitness goals and five believed it would improve their mental health, although the majority (68.8%) also expressed some initial nervousness or anxiety about participation.

The initial assessment was reported to be "easy" by six respondents and only one respondent identified any difficulty with recall or estimation for the diet history interview. Seven respondents noted that the step test was challenging or difficult to complete.

Following the initial assessment, some respondents reported a change in expectations for the program. They mostly reported a better understanding of the individually-tailored client-centred approach (31.3%).

Almost all respondents (93.8%) reported that the program met their expectations by assisting in making lifestyle changes. One respondent did not feel that the program met her expectations because she did not lose weight.

Respondents reported that their relationship with their DEP helped progress towards their goals by encouraging and demonstrating a genuine interest in their progress (62.5%) and helping to set realistic goals (18.8%).

### 3.4.3 Ease of appointments

Seven of 16 respondents reported missing an appointment due to illness/injury (25%) or work commitments (18.8%). Fifteen respondents reported no difficulty coming in for appointments.

All but two respondents (12.5%) reported that there were sufficient appointments. Participants were satisfied with the spacing of appointments (fortnightly initially with a four-week gap between the final two consultations). Respondents reported that the timing of appointments allowed for time to accomplish their homework goals, and that a longer gap towards the end was helpful to practice working on their goals independently. One respondent suggested that a quick review during the four-week break would be of benefit. Three respondents suggested that follow-up phone calls between visits may have helped to maintain motivation.

### 3.4.4 Experience in the attention control condition

Only three of 16 respondents (18.8%) had participated in the attention control condition prior to completing delayed treatment. One reported no lifestyle changes during the control period (despite a visit to the diabetes centre), one reported an increased awareness of her behaviours following the assessment, and another reported making an effort to walk more and change her eating habits during the control condition.

### 3.4.5 Overall experiences and feelings about the program

Most respondents reported that they benefited from participation in the program because it helped them take responsibility for their own health and behaviour (37.5%), and helped them to achieve physical (43.8%) or mental health goals (31.3%). One participant (6.3%) did not feel that she benefited. This was the same participant who reported that the program did not meet her expectations because she did not lose weight.

Twelve respondents reported that they achieved the results they had hoped for. They based this on changes in behaviour and reported their successes as changes in dietary habits (37.5%) or consistently following an exercise program (37.5%). The other four respondents were disappointed that they did not achieve their weight loss goals, and were focused on weight rather than behaviour change as an outcome.

When asked what they found helpful about the program, respondents provided a variety of responses including encouragement, motivation and support (37.5%), goal setting and reviewing (25%), and information sheets (25%).

Ten respondents (62.5%) reported difficulty maintaining the energy and motivation required to exercise regularly, and one (6.3%) reported difficulty with meal planning and cooking. Barriers to participation were reported as poor mental health (18.8%), pre-existing injury (12.5%), weather (6.3%), lack of motivation (6.3%), and time constraints (12.5%). All of the participants who returned for a three-month review interview reported that they had maintained the lifestyle changes that they had adopted during the program.

When asked how the program could be improved, only three respondents provided practical feedback and recommended providing dietary guideline booklets, information on vitamins, and more education on the relationship between diet and mental health. Other respondents commented that they were happy with the program, and two reported that they wished it was ongoing.

#### 3.4.6 Goals for the future

When asked about their goals for the future, respondents typically focused on maintaining or increasing their current diet and exercise goals (93.8%). Weight loss was reported as a goal by six respondents (37.5%). Only one (6.3%) reported a plan to obtain support from an exercise physiologist. Two respondents (12.5%) mentioned mental health goals including increased awareness of their condition and increased socialisation.

### **3.5 Discussion**

#### **3.5.1 Feedback from GPs**

Overall, the majority of GPs reported positive outcomes and experiences with this program. They felt that it was relevant for their patients and easy to refer. Their patients achieved improvements in both physical and mental health, and the volume and rate of feedback was appropriate. Based on these findings, the structure of the program appears to be suitable for a primary care model.

Despite the provision of electronic referral forms embedded in their software, all responding GPs chose to refer by faxing paper referral forms. Future programs should consider providing paper referral pads for GPs, even where electronic forms are available, as this appears to be GPs' preferred mode of referral and having the referral pad on or near their desk may prompt both the GP and the patient to consider the program more frequently.

#### **3.5.2 Feedback from patients**

All patients found out about the program from a treating health professional, most commonly their GP. More cited physical health reasons rather than mental health reasons for participation, and most believed that the program would assist with weight loss or fitness goals. This suggests that many participants entered the program for reasons other than their mental health. The low DASS scores of participants at baseline reported in earlier chapters indicates that participants had mild levels of mental illness and supports the idea that participants were referred to the program for reasons other than their mental health.

The step test was frequently cited as a challenging aspect of the assessment. Other options for assessing aerobic fitness should be considered such as the six minute walk test, or where available, a sub-maximal treadmill test.

Overall, patients provided positive feedback regarding their experiences and reported that the program met their expectations and helped them to achieve their

goals. Those expressing dissatisfaction were unsuccessful in meeting weight loss goals. This indicates that some goals were outcome-focused rather than behaviour-focused, and may indicate a need for further training of the DEPs to assist patients to develop realistic behavioural goals with multiple potential benefits and a high probability of success. Aspects of the program that patients found most helpful were those that align with the principles of motivational interviewing and activity scheduling such as encouragement, motivation and support, goal setting and reviewing, and provision of sought after information. Logically, these components are expected to increase success in behaviour change interventions (Eakin et al., 2000). However, theory-based interventions incorporating the transtheoretical model (Eakin et al., 2000; Salmela et al., 2009), or providing written materials (Pfeiffer et al., 2001; Smith et al., 2000; Swinburn et al., 1998) have been demonstrated to be no more effective than other interventions.

Respondents were generally happy with the structure of the appointments, although some suggested phone calls between visits to enhance motivation. Additional telephonic or online services may be able to be used in conjunction with this type of program to maximise patient success, and online physical activity programs have been demonstrated to be effective (Marcus et al., 2009). There are a variety of services that may be available to patients through health insurance providers and other groups at little or no cost, and this would not increase the burden on program DEPs. However, one review of primary care based physical activity interventions found no obvious benefit of follow-up phone calls (Eakin et al., 2000).

### 3.5.3 Limitations

Responses were obtained only from those who completed the program. More critical feedback may have been received from those who initiated but did not complete the program. Also, many participants declined the invitation to return for a follow-up review and interview. Those who did return may have been more likely to be experiencing positive results and continued success with their goals. The very small sample size limits the generalisability of these results to both the full study



group of participants, and the wider population of primary care patients with depression and/or anxiety.

It is possible that because the interviews were conducted by the DEPs, some patients may have felt compelled to give more positive reports. However, all interviews were conducted by a DEP other than the patient's treating practitioner to encourage patients to be more honest with their responses.

### **3.6 Conclusion**

A lifestyle intervention for GP-referred patients with depression and/or anxiety using an individually-tailored client-centred approach appears to be a suitable model to use, with positive feedback received from both GPs and participants. Physical health benefits were the most frequently cited reason for participation. Participants found the frequency of contact and number of visits, which were consistent with those provided by practitioners through the Enhanced Primary Care Scheme, to be appropriate. Providing services from a central location, rather than in GP rooms, was preferred by most GPs and accepted by patients. Further studies on the feasibility and effectiveness of alternative models of delivering lifestyle interventions for patients with depression and/or anxiety are warranted.

## CHAPTER 4 NUTRITION STATUS, FITNESS AND PHYSICAL ACTIVITY OF PRIMARY CARE PATIENTS WITH DEPRESSION AND ANXIETY<sup>2</sup>

### 4.1 Introduction

This chapter describes and discusses the results of the mental health, dietary, physical activity and fitness assessments at baseline. Results are discussed in light of dietary and physical activity recommendations and population norms.

### 4.2 Methods

GPs in the Illawarra Division of General Practice were informed about the program through continuing education events and newsletter articles, and were invited to refer adult patients currently being treated for depression and anxiety via referral forms available in both electronic and hard copy. Patients under 18 years of age and those with contraindications to participation in physical activity such as uncontrolled hypertension or unstable angina pectoris were excluded from the study. From 2006 to 2008, 34 GPs referred 142 patients to participate. Of these, 109 participants including 32 (29%) men and 77 (71%) women aged between 18 and 77 years met the inclusion criteria and completed an initial assessment. Additional descriptive sample characteristics are provided in the results section and presented in Table 4-1. Informed consent was obtained from all participants before participation, and study methods were approved by the University of Wollongong Human Ethics Committee. For a detailed description of the methods used, refer to Chapter 2.

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<sup>2</sup> Portions of this chapter have been published in the following peer reviewed articles:

Forsyth, A., Williams, P.G. and Deane, F.P. (2012). Nutrition status of primary care patients with depression and anxiety. *Australian Journal of Primary Health*, 18(2), 172-176.

Forsyth, A., Williams, P.G. and Deane, F.P. (in press). Physical activity, but not fitness level, is associated with depression in Australian adults participating in a lifestyle intervention. *Journal of Sports Medicine and Physical Fitness*.

AKF was responsible for the preparation and critical discussions of the manuscript. PGW and FPD were responsible for critical discussions of the manuscript.

**Table 4-1 Demographic, treatment, and clinical characteristics of participants at baseline.**

n	109
Gender	32 males; 77 females
Mean (range) BMI (kg/m <sup>2</sup> )	31.1 (19.6-51.8)
Mean (SD) Total DASS score	23.5 (13.6)
Mean (SD) Total weekly minutes in physical activity	325.6 (359.7)
Number (%) referred with depression	57 (52%)
Number (%) referred with anxiety	21 (19%)
Number (%) referred with both depression and anxiety	31 (28%)
Number (%) being treated by a psychiatrist	17 (16%)
Number (%) reporting a recurrence this year	78 (72%)

The results presented here were collected from the initial assessment that was conducted prior to participation in the program. Assessments were conducted by accredited DEPs or trained final year nutrition and exercise science students. The assessments involved a comprehensive diet history (Martin et al., 2003), and the collection of completed questionnaires including the Depression, Anxiety and Stress Scale (DASS) (Lovibond & Lovibond, 1995) and the Active Australia Survey (Australian Sports Commission, 1998), a self-reported measure of physical activity. The YMCA step test (Golding et al., 1989) was performed as a measure of aerobic fitness, and repeated chair stands and arm curls (Rickli & Jones, 2001) were

performed as measures of muscular endurance. Scores for fitness tests were classified against population norms as ranging from very poor to excellent for aerobic fitness, and well below average to well above average for muscular endurance. Physical measurements including weight, waist circumference, automated blood pressure and manual resting heart rate were taken. Dietary intake was analysed for energy and micronutrient intake by daily intake and as a percentage of the estimated average requirements (EAR) (Department of Health and Ageing, 2006) using the Xyris Foodworks software program version 3.1 (Highgate Hill, Brisbane Australia). The Australian Modified Healthy Eating Index (Aust-HEI) (Throw, 2007) was applied to the information collected in the diet histories. This index rates how well diets conform with national dietary guidelines to obtain a rating score out of 60. Fitness measures were compared to population norms (Rickli & Jones, 1999b), and physical activity levels were compared to the general population (Armstrong et al., 2000). Associations between DASS scores and both nutrient intake and Aust-HEI scores were evaluated using Pearson's correlations. Under-reporting of energy was determined by taking a ratio of reported energy intake to basal metabolic rate (BMR) and applying the Goldberg cut-off limits of  $1.55 \times \text{BMR}$  for diet histories (Goldberg et al., 1991). Correlations between DASS score and other variables including BMI, fitness levels and physical activity levels were calculated using Spearman's correlation coefficients with SPSS version 18. Differences between males and females were evaluated using t-tests.

## **4.3 Results**

### **4.3.1 Mental Health**

A total of 32 (29%) men and 77 (71%) women completed an initial assessment. Patients referred to this program displayed slightly, but not significantly, lower levels of depression, stress and anxiety compared with primary care patients referred for psychological intervention in another Australian study (Vines et al., 2004) (see Table 4-2). On average, patients had their first episode of mental illness 14.3 years ago (range 1–50 years ago). Patients described their primary mental

health problem as depression (28%), anxiety (7%), schizophrenia (1%), bipolar disorder (9%), or both depression and anxiety (45%). Ten percent of patients did not describe their mental health problems. According to GPs, patients referred were currently being treated for depression (52%), anxiety (19%) or both (28%). Concurrent conditions noted by GPs included bipolar disorder (2%), schizophrenia (1%) and eating disorders (1%).

**Table 4-2 Mean (S.D.) levels of depression, anxiety and stress measured using the Depression, Anxiety and Stress Scale (DASS), with comparison to results from another recent Australian study of primary care patients**

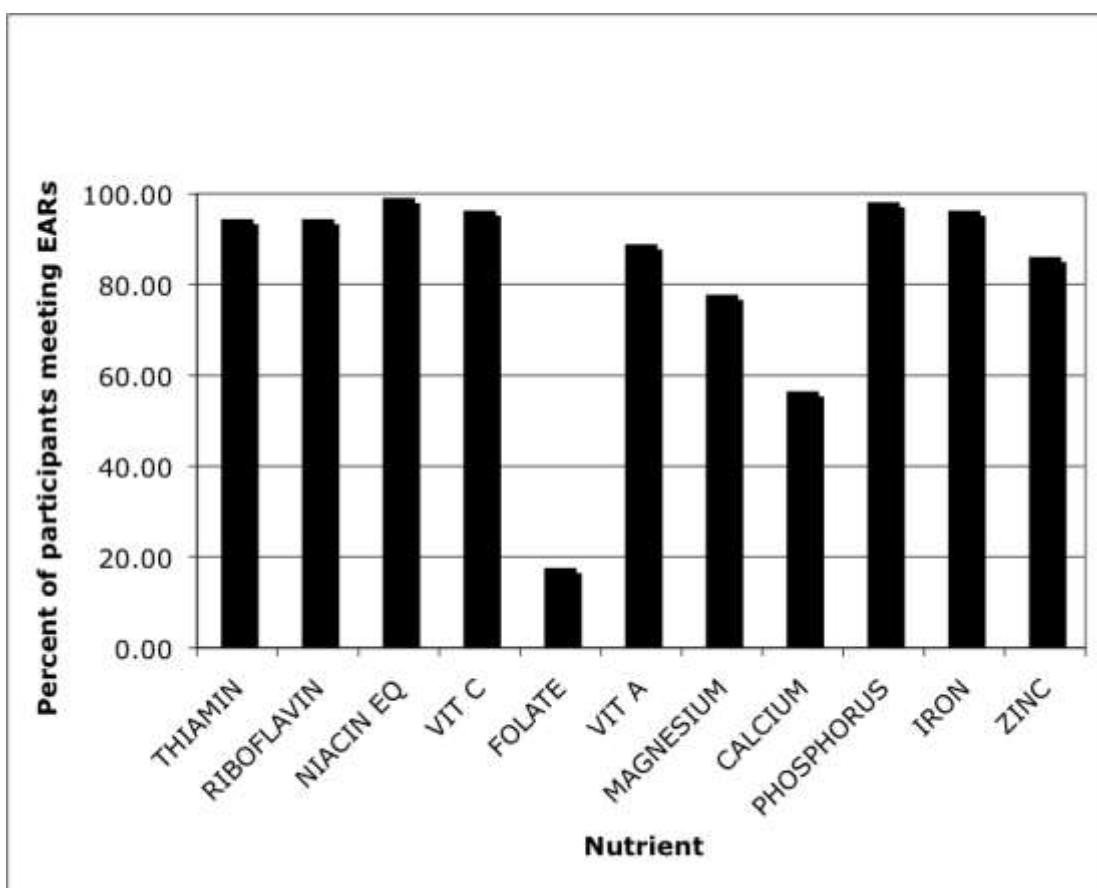
	This study (DASS-21 scores)	Vines et al. (2004) referred for psychological intervention (DASS-42 scores) (n=276)	Vines scores/2 for comparison
Depression	9.08 (5.75)	20.38 (12.03)	10.19
Anxiety	5.75 (4.38)	15.03 (10.95)	7.52
Stress	8.93 (5.29)	22.71 (10.86)	11.36

#### 4.3.2 Anthropometry

On average, the patients referred were obese and abdominally obese with a mean BMI of  $31.1 \text{ kg m}^{-2}$  (range 19.6–51.8) and mean waist circumference 104.6 cm (range 76.0–148.0 cm) for males and 92.6 cm (range 61.5–123.5 cm) for females. Twenty-two patients (20%) had a BMI within the recommended healthy weight range (BMI 20–25). The other 87 patients (80%) were overweight or obese with a BMI of over 25. Neither BMI nor waist circumference was significantly related to psychological distress. Using the Goldberg cut-offs, 74% of subjects were categorised as under-reporters. The degree of under-reporting was not related to BMI ( $r = -0.08$ ,  $P = 0.42$ ). Mean blood pressure was 136/84 (range 99/46 – 191/107 mmHg), SD 16.6 (systolic) and 9.9 (diastolic).

### 4.3.3 Nutrient Intakes

All nutrient intakes calculated by Foodworks software were expressed as a percentage of EAR and analysed in relation to DASS scores. Although the nutrient intake of the patients referred was similar to that of the general Australian population as measured in the last National Nutrition Survey (NNS) in 1995 (McLennan & Podger, 1998), many participants were not meeting the EAR (Figure 4-1). Only 17% of participants met the EAR for folate, with 78% and 57% meeting the EAR for magnesium and calcium, respectively. The EAR for folate is 320 µg per day. Study participants consumed a mean of 253 µg per day (range 24–507 µg).



**Figure 4-1 Dietary intake of participants and baseline expressed as % of participants meeting the Estimated Average Requirements**

Only magnesium intake was significantly related to DASS scores. Magnesium intake expressed as % EAR was negatively correlated with depression, stress and total DASS scores as shown in Table 4-3. This relationship persisted but was not significant when magnesium was expressed in absolute amount consumed (mg per day).

**Table 4-3 Pearson's correlations between magnesium intake by percentage of estimated average requirements (EAR) or absolute amount and Depression, Anxiety and Stress Scale (DASS 21-item version) scales ( $n = 109$ )**

		Depression	Anxiety	Stress	Total DASS score
Mg (%EAR)	$r$	-0.26**	-0.19	-0.22*	-0.26**
Mg (mg day <sup>-1</sup> )	$r$	-0.16	-0.13	-0.16	-0.18

Note: \* $P < 0.05$ , \*\* $P < 0.01$  (2-tailed).

No significant correlations were found between other micronutrients, macronutrients or total energy intake and DASS scores. Intakes of most macronutrients were higher in males than females. This is to be expected given the greater energy needs of males. Only polyunsaturated fatty acid consumption, when expressed as a percentage of energy intake, was slightly but not significantly greater in females (17.9%) than males (16.4%).

#### 4.3.4 Diet quality

The mean total Aust-HEI score of the participants was 42.8 (range 20–60). When the scores were grouped by diet quality, there was a clear reduction in DASS levels in those with the highest Aust-HEI scores. Most subscales of the Aust-HEI were significantly negatively correlated with DASS score except for milk fat and meat fat intake (Table 4-4). Variety, fruit intake, and total Aust-HEI score were the

most significantly associated with depression, anxiety, stress and total DASS score (all  $p < 0.01$ ). Total DASS score was significantly correlated with all subscales.

**Table 4-4 Pearson's correlations between subscales of the Australian Modified Healthy Eating Index and Depression Anxiety Stress Scales (DASS) ( $n = 109$ )**

<b>Aust-HEI subscale</b>	<b>Depression</b>	<b>Anxiety</b>	<b>Stress</b>	<b>Total DASS score</b>
Variety	-0.33***	-0.25**	-0.29**	-0.34***
Healthy choices	-0.23*	-0.124	-0.20*	-0.22*
Fruit intake	-0.31**	-0.25**	-0.38***	-0.37***
Vegetable intake	-0.24*	-0.12	-0.15	-0.21*
Milk fat	-0.07	-0.03	-0.08	-0.07
Meat fat	-0.12	-0.14	-0.14	-0.15
Junk food	-0.24*	-0.13	-0.24*	-0.24*
Total HEI score	-0.37***	-0.26**	-0.37***	-0.39***

Note: \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

Aust-HEI, Australian modified Healthy Eating Index

#### 4.3.5 Fitness levels

Fitness levels of participants are displayed in Figures 5-1 and 5-2. Fifty-three percent of participants had below average or lower levels of aerobic fitness, with poor results also for upper and lower limb muscular endurance (36% and 85% below average, respectively). There was no significant difference between performance in males and females for aerobic fitness or muscular endurance. No significant correlations were found between total DASS scores (or subsets of the



DASS) and fitness levels ( $r = .09$ ,  $p = .38$  for aerobic fitness,  $r = .08$ ,  $p = .38$  for chair stands,  $r = .02$ ,  $p = .82$  for arm curls).

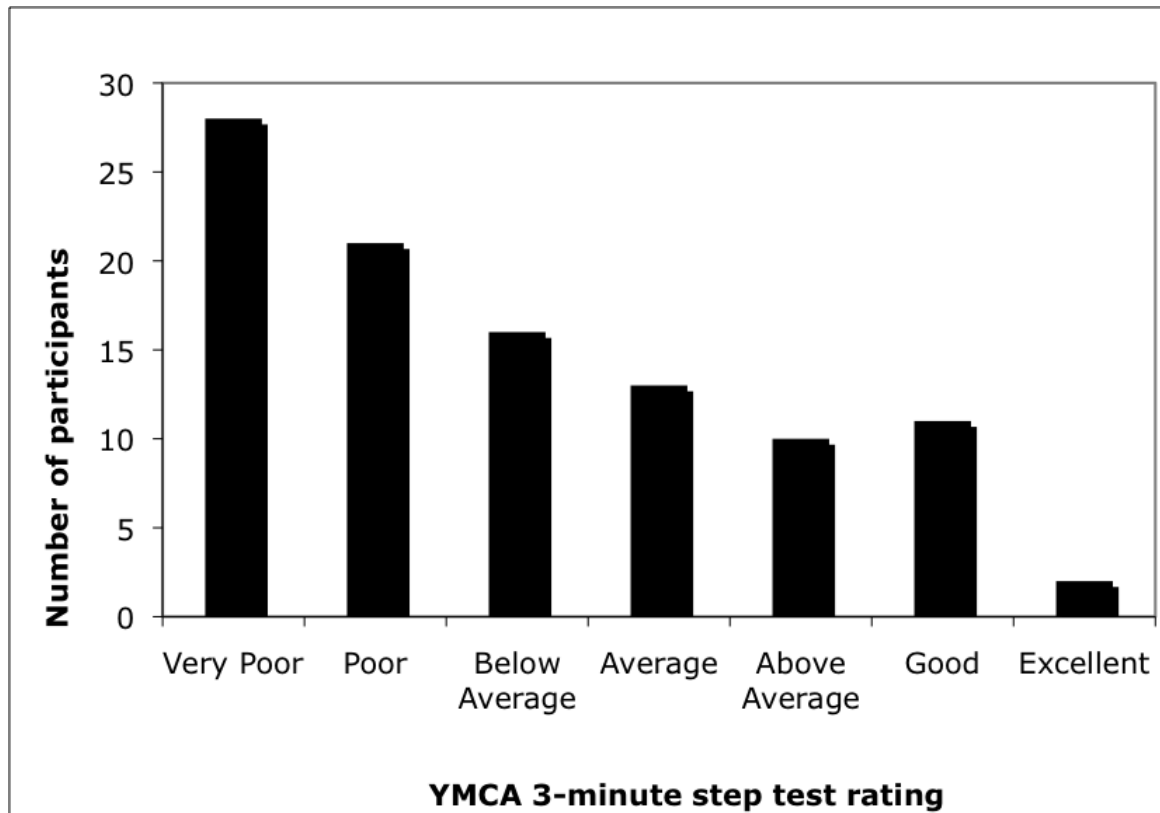
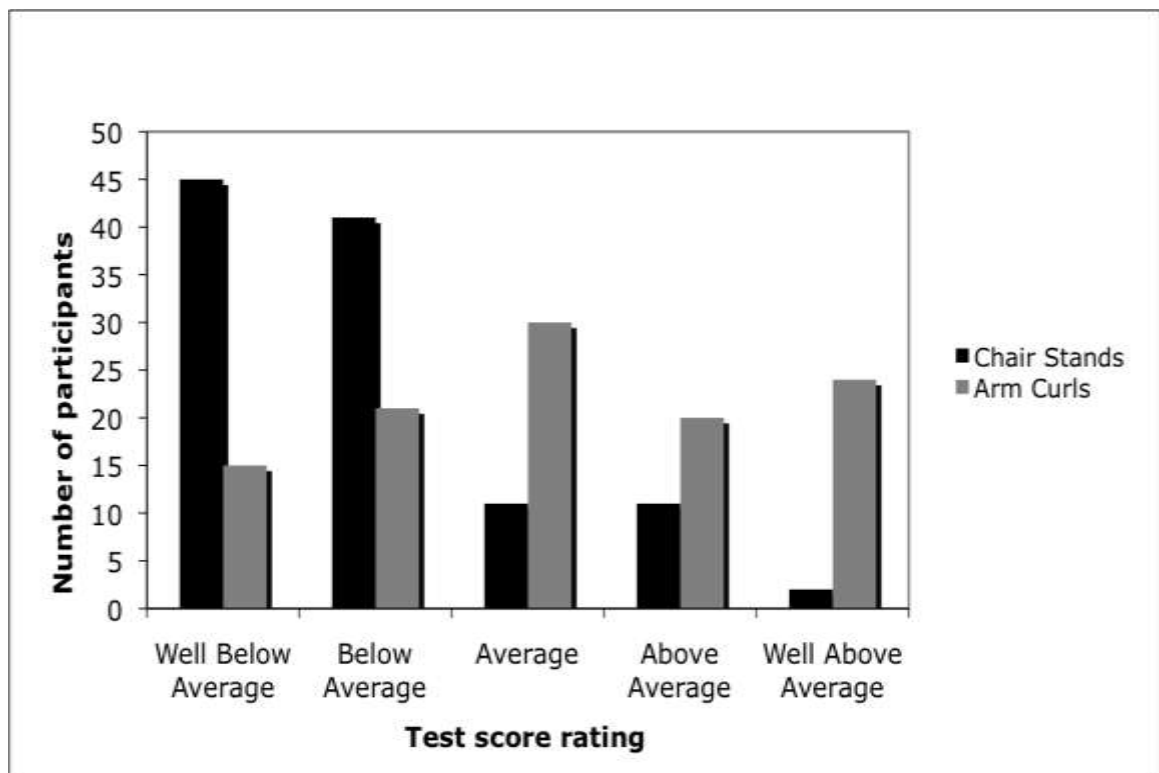


Figure 3.2

Figure 4-2 YMCA Step Test ratings achieved, displayed as number of participants achieving each score



**Figure 3.3**

**Figure 4-3 Arm curl and chair stand ratings achieved, displayed as number of participants achieving each score**

#### 4.3.6 Physical activity

One half (50.5%) of participants met or exceeded the Australian national recommendation (Australian Government, 1999) of at least 30 minutes of moderate physical activity on five or more days per week. However, only 18% of study participants performed the recommended amount of vigorous physical activity (30 minutes on three to four days per week).

There was a significant association between gender and time spent in moderate physical activity ( $r_b = .22$ ,  $p < .05$ ), vigorous physical activity ( $r_b = .30$ ,  $p < .01$ ), and total weekly physical activity ( $r_b = .27$ ,  $p < .01$ ), with men performing significantly more physical activity than women (617 +/- 843 minutes for men versus 289 +/-

352 minutes for women) ( $p < .01$ ). Table 5-2 provides correlations between physical activity and DASS scores.

Small significant inverse relationships were found between total weekly physical activity and depression and total weekly physical activity and total DASS score. Anxiety and stress were not significantly associated with time spent in physical activity. When analysed separately by gender, the relationship between total weekly physical activity and total DASS score was only significant for women (see Table 4-5). The association between depression subscale scores and total weekly physical activity was significant for men ( $r = -.41$ ,  $p < .05$ ), and neared significance for women ( $r = -.22$ ,  $p = .06$ ).

**Table 4-5 Spearman's correlations between weekly time spent in physical activity and levels of depression, anxiety and stress measured using the DASS.**

	Time spent in physical activity		
	Combined	Men	Women
	(n = 109)	(n = 32)	(n = 77)
Depression	-.23*	-.41*	-.22
Anxiety	-.13	.05	-.21
Stress	-.18	-.17	-.19
DASS	-.23*	-.28	-.25*

\* $p < .05$

When physical activity was broken down into time spent walking, time spent in moderate physical activity, and time spent in vigorous physical activity, only vigorous physical activity was associated with total DASS scores (see Table 4-6).

**Table 4-6 Spearman's correlations between total DASS score and weekly time spent in physical activity.**

	<b>Depression Anxiety &amp; Stress Scores</b>		
	<b>Combined</b>	<b>Men</b>	<b>Women</b>
	<b>(n = 109)</b>	<b>(n = 32)</b>	<b>(n = 77)</b>
Walking	-.20	.08	-.21
Moderate	-.15	-.19	-.09
Vigorous	-.29**	-.31	-.28*
Total time	-.23*	-.27	-.25*

\* $p < .05$

\*\* $p < .01$

## **4.4 Discussion**

### **4.4.1 Key findings**

#### *4.4.1.1 Anthropometry*

The patients referred to this study were overweight and obese. There is a known relationship between depression and obesity (Stunkard et al., 2003). However, it is likely that these patients were particularly selected by their GPs for referral to the

study program because they were perceived to be in need of counselling from a DEP for their weight problems as well as their mental health problems.

#### *4.4.1.2 Nutrient intake and diet quality*

With the exception of magnesium, the energy, macronutrient and micronutrient intake of study participants was not related to DASS scores. A recent study of over 5000 Norwegian adults also found an inverse association (odds ratio 0.70) between magnesium intake and depression (Jacka et al., 2009). Magnesium treatment has been used to achieve rapid recovery from depression (Eby & Eby, 2006) using 125–300 mg of magnesium four times per day, which is considerably greater than the Australian recommended upper level of intake as a supplement of 350 mg day<sup>-1</sup> for men and women (Department of Health and Ageing, 2006).

The mean total Aust-HEI score of the participants (42.8) was higher than the mean score of 35.0 for the diet intakes recorded in the 1995 National Nutrition Survey (NNS) (Throw, 2007). This difference can be mostly attributed to differences in scores for the variety (5.6 in NNS, 9.4 in this study) and healthy choices (4.6 in NNS, 8.5 this study) subscales. This may reflect differences in dietary assessment methods rather than actual dietary differences since a diet history was used in this study, whereas the NNS used a 24-h recall method. A review of the NNS data (Throw, 2007) found that women scored higher than men, so the scores in our study may be skewed by the large proportion of women participating.

The significant correlations between the Aust-HEI and DASS scores may appear to contradict the apparently adequate individual nutrient findings. However, the Aust-HEI evaluates the consumption of whole foods. This may be an important assessment tool because it reflects the consumption of foods that contain other nutritious compounds that are not quantified in a nutrient software program analysis. There is also evidence to suggest that the consumption of whole nutritious foods provides greater benefit than simply meeting nutrient requirements (Jacobs & Tapsell, 2007).

The findings of this study suggest that people with more severe symptoms of depression and anxiety are consuming less variety, fewer healthy choices, fewer serves of fruit and vegetables, and more junk (low nutrient density, high energy density) food than those with less severe depression and anxiety. It is not possible from this cross-sectional study to discern a causal direction for this association, i.e. whether the association indicates that poor diets may be contributing to poor mental health, or whether patients with depression and anxiety find it more difficult to access healthy diets. However this data provides specific findings that can be used by dietitians or GPs to form the basis of recommendations for patients with mental health problems.

The mean intakes of individual nutrients in our study were similar to those published in the NNS (McLennan & Podger, 1998). Despite consuming 'normal' amounts of each nutrient, nearly half of the study participants were not consuming the EAR for calcium, and less than one-fifth of study participants met the EAR for folate. There is little research to suggest a role for calcium in mental health problems, but there is a growing body of evidence to suggest that folate plays an important role in maintaining good mental health, particularly with respect to depression. Low folate intake has been associated with depression in French men (Astorg et al., 2008), Finnish men (Tolmunen et al., 2004), and Korean men and women (Kim et al., 2008). The most recent Cochrane review based on three clinical trials suggests that folate may play a role in the treatment of depression (Taylor et al., 2003).

It should be noted that the EAR were used as dietary references here rather than the recommended dietary intakes (RDI) for nutrients. The EAR represents the intake that would be adequate to meet the needs of 50% of the population and is used to assess intakes of groups, whereas the RDI represents the intake that would be adequate to meet the needs of 50% plus two standard deviations (or 98%) of the population and is used to assess individual intakes. By using the EAR as a reference point in this study, the intakes of participants were compared with a

lower standard. This makes the low levels of calcium and folate consumed even more striking.

With the mandatory fortification of bread with folate introduced in 2009 (see Australia New Zealand Food Standards Code Standard 2.1.1 in Food Standards Australia New Zealand 2010), the folate intake of the study population (measured from 2006 to 2008) would be expected to increase. Eating the mean daily adult Australian intake of three slices of bread daily (Australian Bureau of Statistics, 1999) would yield an additional 200 µg of dietary folate equivalents. When added to the mean intake of 253 µg per day, the mean group intake would exceed both the EAR of 320 µg per day and the RDI of 400 µg per day. At this level, 80% of participants would meet the RDI and 93% of participants would meet the EAR for folate.

#### 4.4.2 Fitness

Participants in this study demonstrated mostly below average or lower levels of physical fitness on both the YMCA step test and the chair stand test. These results are unable to be related to the Australian population due to a lack of comparable data. Martinsen et al. (1989) also found that adults with depressive symptoms had poor levels of fitness, and Galper et al. (2006) found dose-response associations between cardiorespiratory fitness and depressive symptoms in both men and women. The present study, however, did not identify any association between fitness levels and DASS scores. This may in part be related to a combination of relatively mild levels of depression reported in this group and anxiety and ceiling effects on the arm curl test. The majority of participants (64%) performed at or better than average on the arm curl test. This may reflect a poor sensitivity of this test to differentiate amongst fitness levels of younger adults. The lack of association with DASS scores despite very poor performance on the step test and chair stand test suggest that there simply may be no relationship present between these variables.

#### 4.4.3 Physical activity

Only one half of the participants in the study performed sufficient physical activity to provide a health benefit. This, however, is significantly greater than the 38% of Australian adults who participated in sufficient physical activity in the 2007-08 Australian National Health Survey ( $p < .01$ )(ABS, 2009), demonstrating that our study sample presented with better baseline physical activity levels than the average Australian. However, only 18% of the sample participated in the recommended levels of vigorous activity. The average time spent in vigorous physical activity was 62 minutes per week, which is comparable to the 65 minutes per week for Australian adults generally (Armstrong et al., 2000) (see Table 4-7). This is of concern given prior research has found an inverse association between depression and/or anxiety and time spent in vigorous physical activity for men (Asztalos et al., 2010). The discrepancy between participation in vigorous physical activity and total physical activity may also explain the relatively poor performance of the participants in fitness testing, as greater participation in vigorous physical activity is likely to result in superior fitness levels.

**Table 4-7 Mean minutes per week spent in physical activity compared to an Australian National Survey (Armstrong et al., 2000).**

	<b>This study</b>	<b>Armstrong (2000)</b>
	n = 109	n = 10643
Walking	130	121
Moderate activity	132	58
Vigorous activity	62	75



#### 4.4.4 Mental health

Depression and total DASS scores were inversely correlated with time spent in physical activity, but not with physical fitness measures. However the relationship between DASS scores and physical activity was small in magnitude. Interestingly, time spent in vigorous physical activity was more highly correlated with total DASS scores than time spent in walking or moderate physical activity. Vigorous physical activities may confer greater benefit for several reasons. Biochemical and physiological mechanisms of improvement in mood such as beta-endorphins, central monoamines, the hypothalamic-pituitary-adrenal axis, and thermogenesis may be more readily activated through vigorous physical activities. Vigorous activities are also more likely to be recreational in nature, performed intentionally, and may involve others (e.g., organised sport). As such, it is also possible that psychological and psychosocial mechanisms such as increased self-efficacy, sense of mastery, social reinforcement and distraction may be achieved in greater measure through vigorous physical activity.

The differential effects for physical activity but not fitness may reflect the relative potency of psychosocial or psychological mechanisms involved in physical activity compared to the more physiological and biochemical responses that would be expected to be associated with higher fitness levels. It may also be the case that physiological and biochemical mechanisms for improved mental health provide short-term benefit, whereas the psychological and psychosocial benefits are longer lasting.

The results presented here are supported by several earlier studies that have found a relationship between physical activity and mental health. Bize et al. (2007) conducted a systematic review of physical activity level and health related quality of life in the general adult population, and found a consistently positive association between physical activity levels and health related quality of life. Galper et al. (2006) examined the cardiorespiratory fitness and physical activity behaviours and levels of depression in over 6500 men and women and found significant dose-response associations between fitness and depression, and physical activity levels

and depression. It was notable that the relationship between activity levels and depression were stronger for men than for women. A similar finding was found in our study with the magnitude of the correlation for men ( $r = -.41$ ) being significant but not for women ( $r = -.22$ ). This suggests that the preventive or treatment effects of physical activity on mental health may be greater for men due to a difference in the physiological response to exercise. It is also possible that depression in men is more responsive to physical activity due to the nature of the activity they are performing, such as engaging in activities that are more vigorous (with greater physiological response) and social (with more psychological response) than the activities performed by women. Anecdotally, several men in our study, and no women, were referred because they were unwilling to pursue traditional treatment modalities such as medication or psychotherapy for their depression or anxiety. The stronger relationship between physical activity and DASS scores for men may be related to men being less likely to receive traditional forms of treatment.

In a population survey, Hamer et al. (2009) reviewed nearly 20 000 responses including a measure of psychological distress and physical activity interviews. Of the participants identified to be experiencing symptoms of psychological distress, all types of physical activity were associated with lower odds of psychological distress (OR 0.59, CI 0.52 - 0.66), and there was a dose-response relationship between level of physical activity and odds of psychological distress (OR 0.67, CI 0.61 – 0.75). That study also found that domestic activity, such as housecleaning, conferred less benefit than leisure time physical activity, providing further speculation of a psychological mechanism.

Unlike Galper et al. (2006), our study found that physical activity, but not physical fitness, was associated with DASS scores. As suggested earlier, this finding may reflect the multiple mechanisms for improving mental health through physical activity. A study of fitness, physical activity and *physical* chronic conditions demonstrated steeper dose-response gradients for health outcomes across categories of fitness than across physical activity groups (Blair et al., 2001). This finding, is contrary to our results and may represent differences due to the

mechanisms involved; specifically, fitness may provide physiological protection against morbidity and mortality from physical conditions, while the psychological benefits gained from participation in physical activity may play a greater role in prevention and management of mental health conditions.

#### 4.4.5 Strengths and limitations of the current study

There are several important factors to consider when reviewing these results. The population studied may not be reflective of all adults with depression or anxiety. Study participants were all community dwelling men and women referred by their GPs. This means that the most severe cases, such as those receiving inpatient hospital treatment, were not included. Also excluded were people who are not accessing primary health care services for socioeconomic, geographic, or other reasons. There was also considerable diversity among study participants. Patients may have been referred when currently being treated for depression, anxiety or both depression and anxiety. Some patients also had other comorbid mental health conditions. The treatment methods used by patients before entry to and during participation in the study included medications, psychological interventions including cognitive behavioural therapy, and group therapy. Some patients were not receiving any of these treatments.

The results, reported as nutrient intakes and Aust-HEI scores, are based on the reports from participants obtained in the diet histories. Despite significant training of the dietitians and students involved in taking the diet histories to maximise accuracy, the intakes reported are highly dependent on receiving accurate responses from participants. The study population was mostly overweight and obese, and there is typically a high incidence of under-reporting amongst overweight and obese people (Maurer et al., 2006). This may be compounded by depression and anxiety, and feelings of guilt over emotional eating (Kretsch et al., 1999). The level of under-reporting that occurred in this study was very high, but not unusual, and was not related to BMI. The common relationship between under-reporting and BMI may not have appeared in this population because most of the subjects were overweight or obese. Under-reporting was inversely related to

intakes of the key nutrients folate ( $P < 0.01$ ) and magnesium ( $P < 0.01$ ) when expressed as  $\text{mg mJ}^{-1}$ . That is, those with poor intake of folate and magnesium were least likely to under-report their overall intake.

The results presented here are supported by three earlier studies that have found a relationship between diet and mental health. Cohen et al. (2002) found that people with mild and moderate psychological distress ate fewer fruit and vegetables and more high fat choices. Adults in Helsinki with poor mental health were less likely to adhere to dietary guidelines including the consumption of fruit, vegetables, reduced fat milk and wholegrains (Sarljo-Lähteenkorva et al., 2004). Adults with a history of suicide attempts were also more likely to underconsume fruit and vegetables (Li et al., 2009). These studies were also correlational so causal conclusions are not clear at this time.

The fitness assessment was conducted using tools that have demonstrated good reliability and validity in healthy populations. Factors that may have influenced performance include human factors such as varying levels of instruction and encouragement from different assessors. All assessors received the same training but the effect of different assessors was a possible confounder due to the large number ( $n=12$ ) conducting assessments. Despite this concern, inter-rater reliability of the fitness assessments was tested in a separate study and not found to influence results (Forsyth, 2008).

Physical activity data was collected using self-reported survey data. Some participants may have either over- or under-estimated their personal physical activity levels, or misunderstood and subsequently misreported the classifications of moderate and vigorous physical activity.

There may also have been a degree of learning involved in the assessments, so that those with previous experience may have performed better than those who had not previously performed the tests. The measures of muscular endurance were selected from the Seniors' Fitness Battery (Rickli & Jones, 2001) due to their portability and ease of use. While they have been shown to be valid and reliable

measures of muscular endurance, this has been demonstrated mostly in older adults. They may be less sensitive and less able to differentiate amongst fitness levels of younger adults. It appeared that the arm curl task was easily completed by many study participants (only 36% scored below average), while the chair stand task was more challenging with 85% of participants scoring below average. This measure may be a better reflection of their true fitness as chair stands are a functional task representative of activities of daily living.

The data presented here is cross-sectional in nature, and thus cannot infer a causal relationship between fitness or physical activity and depression or anxiety. A randomised control trial with baseline and follow-up measures is needed to find any improvement in symptoms with changes in physical activity or fitness levels over time.

#### 4.4.6 Recommendations

Given the demonstrated relationship between dietary intake and mental health, GPs should consider brief screens of their patients' food intake to determine whether further action might be recommended or advised. Australian GPs believe that dietary assessment and advice is part of their role (Mitchell et al., 2011), though many do not include this in their regular practice due to a perceived lack of time or skill (Ball et al., 2010). It is therefore important to keep recommendations brief and simple. General messages about healthy eating using the Australian Guide to Healthy Eating (Smith et al., 1998) will be appropriate for most patients because they were designed to ensure adequate intake of all nutrients for Australian adults. Particular attention should be paid to consuming a variety of wholegrains, fruit and vegetables (especially dark leafy greens) as these are a good source of magnesium and folate. Individuals should aim for a minimum of two serves of fruit and five serves each of vegetables and wholegrains daily (Smith et al., 1998).

Approximately half of the patients being treated for depression and anxiety in this primary care study did not participate in sufficient physical activity to gain a health

benefit. Screening and monitoring physical activity rather than fitness is a quick, inexpensive, non-invasive process that may better reflect the behaviour associated with improvement in mental health. It is recommended that patients' physical activity patterns be screened, with consideration of an active script or referral to an exercise physiologist when the volume of physical activity is deemed to be insufficient. In addition, as this population performs low levels of vigorous physical activity and has lower levels of fitness, a graded exercise program that gradually introduces more vigorous physical activity, up to 30 minutes three to four times per week, as suggested by the National Physical Activity Guidelines for Adults (Australian Government, 1999), is recommended.

#### **4.5 Conclusion**

The patients with depression and anxiety referred to this nutrition and exercise program by their GPs tended to be overweight and obese. Their nutrient intakes were similar to those of the general population. Magnesium intake was negatively correlated with DASS scores and less than one-fifth of the study population met the EAR for folate. Evidence from prior research exists to support the use of folate in the treatment of depression (Taylor et al., 2003) and the results presented here warrant further investigation into the use of magnesium in the prevention and treatment of depression. The results of the Aust-HEI indicated that those with more severe depression and anxiety consumed less variety, had fewer healthy choices, fewer fruit and vegetables, and more junk food (low nutrient density, high energy density).

Although the results suggest the need for increased physical activity in the sample, participants' levels of physical activity were greater than those of the general population. However, they performed low levels of vigorous physical activity and demonstrated lower levels of aerobic fitness and muscular endurance. Physical activity but not fitness levels were inversely correlated with DASS scores. These results support the suggestion that psychological factors are the main mechanisms of improvement in mental health following participation in physical activity. Further

research is recommended to explore the type and amount of physical activity as well as method of delivery for optimum improvement in mental health.

## **CHAPTER 5 AN ATTENTION CONTROL IS AS EFFECTIVE AS A TAILORED LIFESTYLE INTERVENTION IN IMPROVING MENTAL HEALTH OUTCOMES IN PRIMARY CARE**

### **5.1 Introduction**

Chapters 4 and 5 have described the study population and associations of mental health scores with nutrition and physical activity at entry. In this chapter changes in mental health and physical health in the intervention and attention control groups will be described and discussed.

### **5.2 Methods**

#### **5.2.1 Sample**

Power analysis indicated that over 1000 patients would be needed to demonstrate a significant improvement in mental health, based on an effect size of 0.25 on the DASS questionnaire. However, a study of that magnitude was beyond the scope of this project. Power analysis indicated that significant changes in dietary habits could be demonstrated with 63 patients, based on an effect size of 0.5 in the Australian Modified Healthy Eating Index. Other recent studies utilising psychotherapy interventions have demonstrated improvements in mental health with approximately 30 participants in each group (Arean et al., 2005). For this reason, and to allow for a high attrition rate, a goal of 120 referrals was selected, with half assigned to each of the study groups.

Power calculation based on the following variables for DASS scores:

Sigma of variable = 3.61

Effect size of interest = 0.25

Significance level = 0.05

Power = 0.8

Total sample size required = 6653



Sample size required in each group = 3281

Power calculation based on the following variables for HEI scores:

Sigma of variable = 5.0

Effect size of interest = 0.5

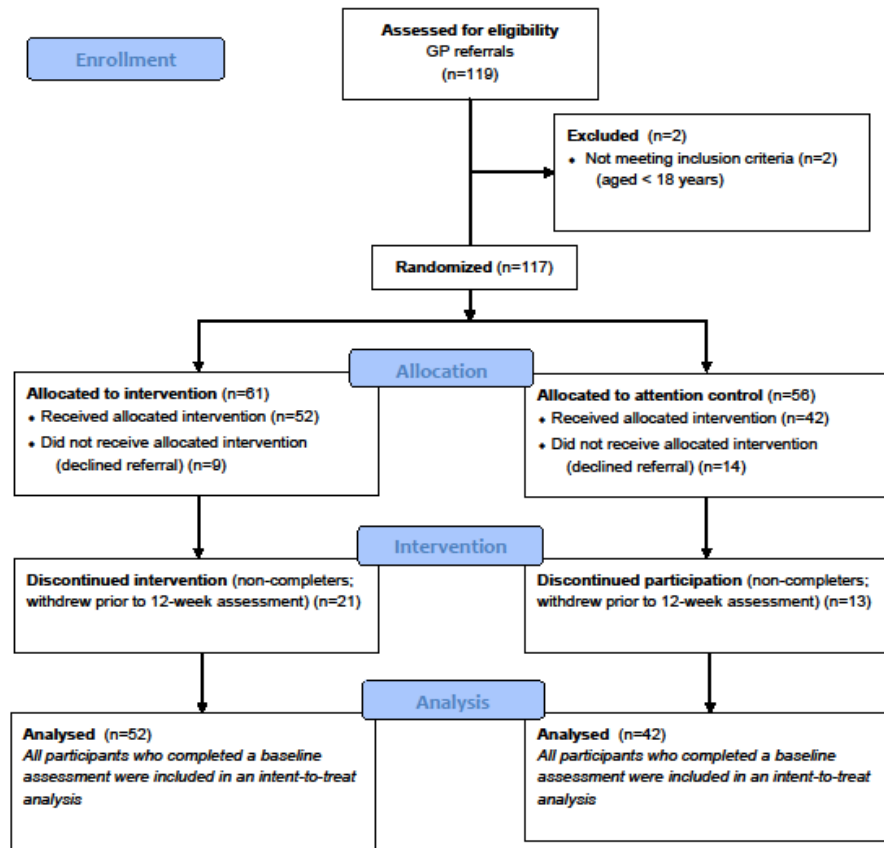
Significance level = 0.05

Power = 0.8

Total sample size required = 63

Sample size required in each group = 31

Between 2006 and 2008, general practitioners (GPs) in the Illawarra Division of General Practice were invited to refer adult patients currently being treated for depression and anxiety. Patients under 18 years of age and those with contraindications to participation in physical activity were excluded from the study. Over a three year period 34 GPs referred 119 patients to the study. Of these, 94 met the inclusion criteria and completed an initial assessment (see Figure 6-1). Note that the number of participants reported here is lower than that reported in chapter 4 where pilot participants were able to be included in an analysis of baseline characteristics. For assessment purposes, patients were considered to have dropped out if they did not attend the final assessment. All 'completed' patients attended both the initial and final assessments and at least two of four consultations. Thirteen participants attended all appointments, twelve missed one consultation, and six participants missed two consultations.



**Figure 5-1 Participant flow chart**

### 5.2.2 Measures

Assessments at baseline and completion were conducted by accredited DEPs or trained final year nutrition and exercise science students. Descriptions and details of the psychometric properties of the measures were provided in Chapter 3. Only

those measures not previously described are detailed here. The assessments involved the YMCA step test (Golding et al., 1989) as a measure of aerobic fitness, and chair stands and arm curls as measures of muscular endurance (Rikli & Jones, 2001). Self-report measures included the Active Australia Survey (Australian Sports Commission, 1998) which assessed physical activity and, the Depression, Anxiety and Stress Scale (DASS) (Lovibond & Lovibond, 1995) which assessed psychological symptom distress. A comprehensive diet history (Martin et al., 2003) was conducted through interview and dietary intake was analysed for nutrient intake by weight and as a percentage of the Estimated Average Requirements (Department of Health and Ageing, 2006) using the Xyris Foodworks software program version 3.1. The Australian Modified Healthy Eating Index (Aust-HEI) (Throw, 2007) was applied to the information collected in the diet histories to rate how well diets conform to national dietary guidelines.

The study design and procedure are outlined in Chapter 2.

### 5.2.3 Statistical Analyses

The data from all participants who commenced the study were included in an intention to treat analysis. Due to high levels of attrition there was a large amount of missing data with 35% loss to follow up, therefore the effectiveness of the lifestyle intervention was assessed using SPSS with linear mixed model analyses (also known as multilevel modelling or hierarchical linear modelling). Mixed model analyses allow for the analysis of partial data sets, and are robust in handling missing data and unbalanced designs in repeated-measures research, enabling all participants to be included in the data analysis without omitting missing cases (Nich & Carroll, 1997; Houck, Mazumdar Koru-Sengal et al., 2004; Gueorguieva & Krystal, 2004).

A linear mixed model analysis was performed by assessing interaction and main effects of group and time for all dependent variables. Before analysis, data for all variables were inspected for missing values, normality and outliers. Violations of normality were identified for BMI (moderate positive skew) and measures of

physical activity (severe positive skew). These were addressed by transforming BMI into the square root of the original measure, and by applying a log followed by an inverse transformation to measures of physical activity.

Potential moderating factors were identified as gender (Chen et al., 2006), other treatment modalities (Hale, 1997), reason for referral, years since diagnosis and recurrence of condition within 12 months. These factors were examined as confounders for all other variables by incorporating them into the linear mixed model as fixed effects and testing each variable separately. Tests of significance less than or equal to .05 were considered statistically significant. To examine the moderating effects, post hoc between groups t-tests at baseline and post-test were conducted for all moderating factors found to have a significant effect on the linear mixed model. Figures were created to demonstrate changes in primary outcome variables and variables where there were significant differences for group, time or group x time effects.

### **5.3 Results**

#### **5.3.1 Sample**

One hundred nineteen patients ranging in age from 18 to 84 years were referred to the study between 2006-2008. Figure 6.1 provides the participant flow diagram through the study. Two patients under the age of 18 were referred and excluded from the study. Sixty-one patients were assigned to the intervention group of which 52 participated in baseline assessments and 31 completed the study protocol. Fifty-six patients were assigned to the attention control group of which 42 completed an initial assessment and 29 completed the study protocol. In the intervention group, two participants dropped out following the initial assessment, five dropped out following the first consultation, and the others dropped out after one or more review consultations. Reasons for drop out were not generally provided, though some participants cited lack of time. Total DASS and anxiety scores were higher, though not significantly ( $p=0.8$  and  $p=0.7$ ) at baseline in participants who did not complete the study protocol ( $M = 26.2$ ,  $SD = 14.9$  for total

DASS;  $M = 6.7$ ,  $SD = 4.9$  for anxiety) than those who did complete the study program ( $M = 21.1$ ,  $SD = 11.7$  for total DASS;  $M = 4.7$ ,  $SD = 3.7$  for anxiety) [ $t(df) = -1.8 (92)$  for total DASS;  $t(df) = 2.2 (92)$  for anxiety]. Non-completers did not differ from other study participants on any of the other measures tested. At the time of the initial assessment, there were 14 males and 38 females in the intervention group, and 12 males and 30 females in the attention control group.

**Table 5-1 Demographic, treatment, and clinical characteristics of both groups at baseline**

	Intervention (n=52)			Attention Control (n=42)		
	Mean	SD	n%	Mean	SD	n%
BMI (kg/m <sup>2</sup> )	31.6	7.5		31.8	6.6	
Total DASS score	21.2*	13.2		26.5*	13.7	
Total weekly minutes in physical activity	331.6	384.6		318.4	330.9	
Total Aust-HEI score	43.6	9.2		42.9	9.1	
Number referred with depression			24 (46%)			23 (55%)
Number referred with anxiety			13 (25%)			6 (14%)
Number referred with both depression and anxiety			15 (29%)			13 (31%)
Number being treated by a psychiatrist			10 (19%)			7 (17%)
Number reporting a recurrence this year			41 (79%)			37 (88%)

\* significant difference at  $p < .05$

The number of participants who provided data for each of the variables is indicated in Tables 6-5, 6-6 and 6-7. The number of participants who provided data for each variable was lower where there was missing data, for example when participants were unable to complete an assessment (such as a step test), or incorrectly completed study questionnaires (such as the Active Australia physical activity questionnaire).

Data was available from 94 participants who were included in the analyses. At baseline, there were no significant differences between the intervention and attention control groups on a range of descriptive and outcome variables measured using between groups t-tests. Despite trends toward lower DASS scores, higher Aust-HEI scores, and greater numbers referred with anxiety in the intervention group, only total DASS scores were significantly different at baseline ( $p < .05$ ) (see Table 5-1).

### 5.3.2 Self-selected participant goals

Health behaviour goals selected by participants were categorized as physical activity (Table 5-3), dietary (Table 5-4), or other health and lifestyle behaviours. The most popular health behaviours selected were walking, home resistance exercises, and gym attendance. Fewer participants selected one specific dietary change, though there was a larger number and wide variety of dietary changes selected. Reducing portion sizes was the most common dietary change selected. Less than 5% of participants selected a goal that was not related to physical activity or dietary changes. These goals, selected by two participants each, included establishing a sleeping routine, relaxation breathing, smoking cessation, prayer, joining a social group, and monitoring blood sugar levels. Physical activity goals were selected by 87 participants, dietary goals were selected by 70 participants, and other goals were selected by 12 participants. Goal combinations selected by participants are outlined in Table 5-2.

**Table 5-2 Goal combinations selected by participants**

<b>Goal combination</b>	<b>Number of participants</b>	<b>%</b>
Diet only	7	7.4
Physical activity only	20	21.3
Diet + Physical activity	55	58.5
Physical activity + Other	4	4.3
Diet + Physical activity + Other	8	8.5

**Table 5-3 Top ten physical activity goals**

<b>Goal</b>	<b>Number of participants</b>	<b>%</b>
Walking	69	73.4
Home resistance exercises	32	34.0
Gym attendance	21	22.3
Cycling	16	17.0
Swimming	13	13.8
Contacting a gym	8	8.5
Incidental activity	8	8.5
Running	5	5.3
Home aerobic exercises	5	5.3
Playing organized sport	5	5.3

Note: a full list of activities selected is provided in Appendix R

**Table 5-4 Top 13 dietary goals**

<b>Goal</b>	<b>Number of participants</b>	<b>%</b>
Reduce sources of fat	17	18.0
Reduce portion sizes	13	13.8
Keep a food diary	10	10.6
Formal diet plan	10	10.6
Choose healthy snacks	9	9.6
Increase intake of fruit	8	8.5
Increase intake of vegetables	8	8.5
Increase sources of calcium	7	7.4
Address emotional eating	6	6.4
Increase intake of dairy foods	6	6.4
Increase intake of fish	6	6.4
Vitamin supplements	6	6.4
Reduce 'junk food' intake	6	6.4

Note: a full list of activities selected is provided in Appendix R

### 5.3.3 Mental Health

Results of the linear mixed model analyses found that the intervention group had significantly lower DASS scores than the control group at baseline (see Group effect in Table 5-5:  $p < .05$ ). DASS scores improved significantly over time in both the attention control and intervention groups (see Time effect in Table 5-5:  $p < .001$  and Figures 5.2, 5.8, 5.9 and 5.10); however there was no significant interaction effect indicating no differential rates of improvement between groups (see Group x Time effect, Table 5-5).



Moderating factors with a significant impact on change in DASS score over time were treatment by a psychiatrist ( $p < .05$ ), and having a recurrence of their condition within the past 12 months ( $p < .05$ ). T-tests revealed no differences in DASS scores between patients seeing a psychiatrist and those not seeing a psychiatrist at baseline, however those who were seeing a psychiatrist had significantly higher DASS scores at completion ( $M = 25.3$ ,  $SD = 13.6$ ) than those not seeing a psychiatrist ( $M = 15.5$ ,  $SD = 11.3$ ),  $t = -2.2$  ( $df = 13.1$ ),  $p < .05$ . This suggests that patients who were also seeing a psychiatrist were less successful at decreasing their psychological symptom distress through this program. Participants experiencing a recurrence of their condition in the past 12 months demonstrated significantly higher DASS scores both at baseline ( $M = 25.4$ ,  $SD = 13.2$  vs  $M = 15.1$ ,  $SD = 10.4$ ),  $t = -2.9$  ( $df = 13.1$ ),  $p < .05$  and follow-up ( $M = 18.2$ ,  $SD = 12.4$  vs  $M = 10.0$ ,  $SD = 4.2$ ),  $t = -3.5$  ( $df = 23.4$ ),  $p < .01$  compared to those who did not have a recurrence.

**Table 5-5 Changes in measures of mental health over time. Pre and post values expressed as mean (SD) [n]. Differences between groups, over time, and group by time interactions for dependent variables displayed as p values.**

	Attention Control			Intervention			p-value	p-value	p-value
	Pre test	Post test	Difference (% change)	Pre test	Post test	Difference (% change)	Group effect	Time effect	Group x Time effect
	M (SD) [n]	M (SD) [n]		M (SD) [n]	M (SD) [n]				
Total DASS score	26.5 (13.7) [42]	18.4 (11.1) [31]	-6.1 (-23.0%)	21.2 (13.2) [52]	16.1 (13.3) [32]	-5.1 (-24.1%)	.04*	.00**	.97
DASS – depression subscale	9.9 (5.4) [42]	5.9 (3.5) [31]	-4.0 (-40.4%)	8.1 (6.0) [52]	6.0 (6.2) [32]	-2.1 (-25.9%)	.10	.00**	.97
DASS – anxiety subscale	6.7 (5.2) [42]	3.7 (3.5) [31]	-3.0 (-44.8%)	4.9 (3.9) [52]	3.5 (3.3) [32]	-1.4 (-28.6%)	.08	.00**	.35
DASS – stress subscale	9.8 (5.2) [42]	8.0 (4.8) [31]	-1.8 (-18.4%)	8.2 (5.4) [52]	6.7 (5.1) [32]	-1.5 (-18.3%)	.06	.01*	.61

\* significant difference at  $p < .05$  \*\* significant difference at  $p < .001$

#### 5.3.4 Physical activity, fitness and anthropometric measures

There were significant improvements across measures of physical activity ( $p < .05$ ) and muscular endurance ( $p < .001$ ), and near significant improvements over time in aerobic fitness ( $p=.05$ ), diastolic blood pressure ( $p=.05$ ), weight ( $p=.05$ ) and BMI ( $p=.08$ ) in both groups (see Time effects in Table 5-6 and Figures 5.4, 5.5, 5.6 and 5.7). There was a significant Group x Time effect for BMI ( $p < .05$ ) with greater improvement in the intervention group than the attention control group (see Table 5-6, and Figure 5-4).

Moderating factors did not impact on the outcome of physical activity and fitness levels except for reason for referral which had a significant effect on change in physical activity level ( $p < .05$ ). Patients referred with depression ( $M = 242.4$  weekly minutes,  $SD = 239.1$  239.1),  $t = 2.3$  ( $df = 71.3$ ),  $p < .05$ , spent significantly less time in physical activity than those referred with anxiety ( $M = 410.2$  weekly minutes,  $SD = 462.6$ ) or both depression and anxiety ( $M = 407.9$  weekly minutes,  $SD = 426.1$ ).

#### 5.3.5 Nutrition

There were significant improvements across measures of nutrient intake ( $p < .01$ ) and diet quality assessed by the total Aust HEI score ( $p < .05$ ) in both groups (see Time effects in Table 5-7 and Figure 5.3). However, there were no significant differences in improvement between groups for most variables.

Energy intake reduced significantly over time for both groups ( $p<.001$ ). There was a significant Group x Time effect for iron intake ( $p < .05$ ) (see Table 5-7, and Figure 5-11), where the intervention group improved iron intakes by 6.5% and the attention control group had a reduction in iron intakes of 13.2%. There was a non-significant ( $p = .08$ ) trend toward a Group x Time effect for improvement in folate intake (Group x Time effect Table 5-7 and Figure 5-12). Folate intake also decreased in the attention control group (16.4%), and was relatively unchanged in the intervention group (0.8% increased intake). This difference between groups

over time neared significance ( $p=0.8$ ). Magnesium and calcium intakes decreased over time in both the intervention and attention control groups, but the decrease was more pronounced for the attention control group (10.0% vs 3.6% decrease in magnesium intake and 19.6% vs 11.5% decrease in calcium intake).

The intervention and attention control groups performed similarly on the Aust-HEI, with significant improvements over time for the meat and junk food subscales as well as total scores (all  $p<.05$ , see Table 5.7). There were no significant differences between groups over time for any of the subscales; however the intervention group demonstrated a greater increase in fruit intake (8.6% increase vs 1.5% decrease for attention control group) and a greater improvement in junk food intake (25.0% improvement vs 11.9% improvement for attention control group).

Moderating factors did not impact on the outcome of nutrient intakes or Healthy Eating Index scores.

**Table 5-6 Changes in fitness, physical activity and anthropometric measures over time. Pre and post values expressed as mean. Where data was highly skewed, median valued are also reported Differences between groups, over time, and group by time interactions for dependent variables displayed as p values.**

		Attention Control			Intervention			p-value	p-value	p-value
		Pre test	Post test	Difference (% change)	Pre test	Post test	Difference (% change)	Group effect	Time effect	Group x Time effect
Total time in physical activity (minutes per week) <sup>a</sup>	M (SD) [n]	318.4 (330.9) [42]	432.4 (471.7) [31]	114.0 (35.8%)	331.6 (384.6) [52]	434.5 (355.8) [31]	102.9 (31.0%)	.87	.04*	.73
	Median (interquartile range)	185.0 (60.0, 495.0)	285.0 (77.9, 565.0)	100.0 (54.0%)	197.5 (22.5, 537.5)	300.0 (150.0, 675.0)	102.5 (51.9%)			
Time in moderate physical activity (minutes per week) <sup>a</sup>	M (SD) [n]	140.4 (205.0) [37]	153.8 (246.4) [29]	13.4 (9.5%)	102.8 (176.1) [50]	98.7 (160.0) [31]	-4.1 (-4.0%)	.92	.22	.67
	Median (interquartile range)	50.0 (0.0, 180.0)	142.5 (30.0, 624.0)	92.5 (185%)	32.5 (0.0, 120.0)	60.0 (1.0, 120.0)	27.5 (84.6%)			

		Attention Control			Intervention			p-value	p-value	p-value
Time in vigorous physical activity (minutes per week) <sup>a</sup>	M (SD) [n]	36.6 (72.5) [41]	69.7 (100.3) [30]	36.1 (98.6%)	59.0 (99.9) [50]	91.1 (104.9) [31]	32.1 (54.4%)	.80	.50	.85
	Median (interquartile range)	0.0 (0.0, 30.0)	97.5 (0.0, 222.0)	97.5 (0%)	0.0 (0.0, 97.5)	60.0 (0.0, 150.0)	60.0 (0%)			
YMCA step test (heart rate /minute)	M (SD) [n]	119.5 (15.6) [36]	122.8 (22.0) [27]	3.8 (3.2%)	123.8 (22.5) [42]	116.6 (19.1) [27]	-7.2 (-5.8%)	.99	.05*	.37
Muscular Endurance (Chair stands + arm curls in 30 seconds)	M (SD) [n]	30.9 (6.4) [41]	35.2 (7.6) [29]	4.3 (13.9%)	32.3 (8.2) [52]	37.5 (11.6) [31]	5.2 (16.1%)	.31	.00**	.59
Systolic blood pressure (mmHg)	M (SD) [n]	140.0 (19.0) [42]	132.3 (18.7) [30]	-7.7 (-5.5%)	133.4 (14.1) [52]	134.0 (15.0) [31]	0.6 (0.4%)	.32	.23	.09
Diastolic blood pressure (mmHg)	M (SD) [n]	84.4 (9.6) [42]	81.2 (9.8) [30]	-3.2 (-3.8%)	83.6 (9.6) [52]	81.6 (8.5) [31]	-2.0 (-2.4%)	.91	.05*	.58

		Attention Control			Intervention			p-value	p-value	p-value
Weight (kg)	M (SD) [n]	88.0 (18.9) [42]	86.5 (18.7) [30]	-1.5 (-1.7%)	90.6 (25.6) [32]	88.7 (24.2) [52]	-1.9 (-2.1%)	.91	.04*	.58
BMI (kg/m <sup>2</sup> ) <sup>a</sup>	M (SD) [n]	31.8 (6.6) [42]	31.1 (7.1) [30]	-0.7 (-2.2%)	31.6 (7.5) [52]	30.7 (8.1) [32]	-0.9 (-2.8%)	.64	.08	.04*
	Median (interquartile range)	30.4 (27.1, 35.7)	30.1 (26.6, 35.7)	-0.3 (-1.0%)	30.9 (27.1, 35.8)	29.6 (23.4, 35.8)	-1.3 (-4.2%)			

\* significant difference at  $p < .05$  \*\* significant difference at  $p < .001$  <sup>a</sup> expressed also as median (interquartile range)

**Table 5-7 Changes in measures of nutrition over time. Pre and post values expressed as mean (SD) (n). Differences between groups, over time, and group by time interactions for dependent variables displayed as p values.**

	Attention Control			Intervention			p-value	p-value	p-value
	Pre test	Post test	Difference (% change)	Pre test	Post test	Difference (% change)	Group effect	Time effect	Group x Time effect
	M (SD) [n]	M (SD) [n]		M (SD) [n]	M (SD) [n]				
Energy intake (kJ/d)	9418.4 (2405.2) [42]	7853.9 (2577.6) [29]	-1564.5 (-16.6%)	8855.6 (2759.1) [51]	7970.5 (2152.3) [32]	-885.1 (-10.0%)	.68	.00**	.30
Folate intake (ug/d)	267.8 (99.0) [42]	223.9 (75.0) [29]	-43.9 (-16.4%)	248.3 (75.7) [51]	250.2 (84.2) [32]	1.9 (0.8%)	.96	.01*	.08
Magnesium intake (mg/d)	360.8 (114.2) [42]	324.6 (113.1) [29]	-36.2 (-10.0%)	362.4 (94.1) [51]	349.2 (108.6) [32]	-13.2 (-3.6%)	.40	.01*	.26
Calcium intake (mg/d)	926.2 (387.8) [42]	781.0 (267.4) [29]	-181.2 (-19.6%)	1119.1 (476.7) [51]	990.3 (339.0) [32]	-128.8 (-11.5%)	.00**	.02*	.74
Iron intake (mg/d)	12.9 (3.9) [42]	11.2 (3.08) [29]	-1.7 (-13.2%)	12.3 (3.1) [51]	13.1 (4.4) [32]	0.8 (6.5%)	.31	.22	.01*



	Attention Control			Intervention			p-value	p-value	p-value
Total Aust-HEI score	42.9 (9.1) [42]	44.4 (7.6) [29]	1.5 (3.5%)	43.6 (9.2) [52]	46.0 (11.3) [32]	2.4 (5.5%)	.27	.02*	.28
Aust-HEI – variety	9.5 (1.0) [42]	9.3 (0.8) [29]	-0.2 (-2.1%)	9.4 (0.9) [52]	9.5 (1.0) [31]	0.1 (1.1%)	.61	.57	.27
Aust-HEI – choice	8.7 (2.0) [42]	8.6 (2.0) [29]	-0.1 (-1.1%)	8.6 (2.2) [52]	8.7 (2.0) [31]	0.1 (1.2%)	.98	.98	.63
Aust-HEI – fruit	6.8 (3.1) [42]	6.7 (2.8) [29]	-0.1 (-1.5%)	7.0 (3.2) [52]	7.6 (2.5) [31]	0.6 (8.6%)	.29	.64	.43
Aust-HEI – veg.	5.7 (2.3) [42]	6.3 (2.2) [29]	0.6 (10.5%)	6.3 (2.4) [52]	6.8 (2.0) [31]	0.5 (7.9%)	.15	.14	.95
Aust-HEI – milk	4.0 (2.0) [42]	4.3 (1.6) [29]	0.3 (7.5%)	3.9 (2.0) [52]	4.1 (1.8) [31]	0.2 (5.1%)	.77	.17	.91
Aust-HEI – meat	3.7 (1.9) [42]	4.1 (1.8) [29]	0.4 (10.8%)	4.0 (1.7) [52]	4.5 (1.4) [31]	0.5 (12.5%)	.24	.04*	.83
Aust-HEI - junk	4.2 (3.0) [42]	4.7 (2.6) [29]	0.5 (11.9%)	4.8 (3.2) [52]	6.0 (2.9) [31]	1.2 (25%)	.09	.05*	.37

\* significant difference at  $p < .05$ \*\* significant difference at  $p < .001$

## 5.4 Discussion

### 5.4.1 Goal Selection

Participants were most likely to choose a combination of both physical activity and dietary goals (58.5%), followed by physical activity goals only (21.2%). Walking was the most popular physical activity goals (n=69). Few participants wanted to only work towards dietary goals (7.4%). Based on the goals selected by participants, future programs with defined program goals should consider including walking, or physical activity more broadly, as this appears to be the most popular behaviour change that participants felt was important, achievable and enjoyable. Dietary goals were most commonly added by participants part way through the program. Participants may have felt more confident tackling dietary changes following success with their physical activity goals.

Most goals selected involved simple physical activities or dietary modifications. Other goals, such as home resistance programs, may require input from another health professional such as an exercise physiologist to ensure appropriate and safe exercises are being performed, especially in clients with pathology. Specific dietary changes such as medical nutrition therapy would also require input from a dietitian. It is likely that participants could self-select their goals and work with any allied health professional to make simple changes. Participants with acute or chronic medical conditions would require referral to exercise physiologists or dietitians for expert advice regarding the optimal management for their condition. As most participants were interested in making both dietary changes and increases in their physical activity levels, DEPs are in an ideal position to address both of these goal types whenever the client indicates a readiness to change.

### 5.4.2 Mental Health

While there was significant improvement in DASS scores over time, the intervention group did not improve significantly more than the control group. There are many potential factors that may have contributed to this outcome. All patients

referred to the program were identified by their GP as currently being treated for depression and/or anxiety. As such, they were aware of their condition and voluntarily seeking treatment. All participants had agreed to take part in the lifestyle intervention, either immediately or following a 12-week delay. This demonstrates a readiness to change and desire to modify lifestyle behaviours.

As all participants were already seeking treatment from their GP, improvements may have also been reflective of other treatment such as medication or counselling. Many participants were receiving other forms of treatment during the study period. This could have directly improved their mental health, and indirectly improved their lifestyle behaviours through increased motivation.

The attention control approach appears to be as effective as individual lifestyle counselling at improving mental health outcomes. Attention control group participants took part in an initial assessment and received phone calls at the same intervals as intervention group face-to-face appointments. No advice or motivational interviewing techniques were employed during the phone calls, however patients were aware that the DEP would be calling at regular intervals and asking about any changes to their diet or physical activity patterns. It may have been motivating for these participants to be held accountable for their lifestyle behaviours. The extensive assessment process would have also drawn attention to health and lifestyle goals. For some participants this may have developed discrepancy between current behaviours and desired outcomes and motivated them to make lifestyle changes. For others, participation in the physical assessment may have improved their self-efficacy beliefs which are known to predict health outcomes (Bandura, 2005).

Patients seeing a psychiatrist did not improve their mental health as much as other participants in this program. While these patients did not have higher DASS scores at baseline, they may have other comorbid psychiatric conditions or more treatment-resistant depression and anxiety than other participants, which impacted on their ability to meet their program goals.

### 5.4.3 Physical activity, fitness and anthropometric measures

Both the intervention and attention control groups improved their participation in physical activity and their fitness levels over the course of the study period. The factors described above are also likely to have impacted on these measures. Control group improvements in physical activity trials occur in more than 25% of trials and may be attributed to behavioural measurements and participant characteristics (Waters et al., 2012). Lower levels of participation in physical activity at baseline for patients referred with depression may be related to difficulty with motivation to participate in physical activities. A review of the role of baseline depression on subsequent physical activity found that baseline depression was significantly associated with subsequent sedentary lifestyle to poor adherence to exercise prescriptions (Roshanaei-Moghaddan et al., 2009). This may be related to the associated low motivation and need for activity scheduling with depression. However, a study examining the transition between activity and inactive recreational activity patterns found that major depression increased the risk of transition into inactive patterns for those previously active, but did not affect the probability of moving from an inactive to an active lifestyle (Patten et al., 2009). This is promising as it suggests that while depression may be associated with lower levels of physical activity, it does not necessarily predict a poor response to behaviour modification.

In our study, desired behaviours were planned, and this activity scheduling may have assisted participants to adhere to their physical activity goals. Some participants reported significant difficulty with participation in their desired behaviours due to anxiety. One participant wanted to use equipment at a local fitness centre as she saw this as an opportunity to escape from her busy family life. She had previously purchased a membership to the fitness centre but had only used the facilities once due to anxiety and potential panic attacks about the perceived risks of entering this unfamiliar environment, using equipment with which she was not familiar, and interacting or being judged by others. Another participant wanted to stop for a walk on a trail on her way home from work in the afternoons,

as this would avoid many of the previously mentioned perceived risks. She still struggled with meeting this goal and reported that after work she just wanted to go home and watch television because that was the only way that she felt she could switch off and escape from her racing thoughts and worries. Thus, anecdotally, it appears that participants with anxiety had significant barriers to participation in physical activity.

In meta-analyses of the effects of exercise treatment on anxiety and depression, moderators of the effect size have been found to be exercise duration and duration of training period. For anxiety, sessions lasting greater than 30 minutes duration have been reported to be more effective than those of shorter duration, and training periods of 3-12 weeks more effective than those greater than 12 weeks (Herring et al., 2010). For depression, exercise bouts lasting 45-59 minutes were more effective than those of shorter or longer duration, and studies of 10-16 week duration more effective than those lasting 4-9 weeks (Rethorst et al., 2009). Effect sizes in the Rethorst et al. (2009) meta-analysis were also larger for studies using population with clinical depression than for non-clinical samples.

The present study adopted a naturalistic and client-centred approach, which in many cases meant that clients were not exercising at levels prescribed in those clinical trials. Data on specific elements of homework, such as time or frequency, were not collected, so specific training elements were unable to be evaluated as moderating factors in this study.

#### 5.4.4 Nutrition

Both the intervention and attention control groups also improved their diet quality over the course of the study period. The only dietary variables with significantly greater changes in the intervention group than the attention control group were BMI and iron intake. There was a non-significant trend toward greater improvement of folate intake in the intervention group. This is particularly relevant as iron and folate have been identified as nutrients that may play a role in the prevention and treatment of depression (Astorg et al., 2008; Murakami et al., 2008; Rangan et al.,

1998; Tolmunen et al., 2004). The intervention group increased their intake of these nutrients while the intake of these nutrients decreased in the attention control group. The attention control group also had greater reductions in calcium and magnesium intake, and smaller improvements in fruit and junk food intake. The replacement of more junk food with fruit may partially explain the more improved or retained nutrient intakes of the intervention group.

Both groups reduced their energy intake, weight and BMI, but these findings demonstrate that the intervention group was more effective in improving diet quality. This suggests that while individuals are able to make dietary changes and lose weight on their own, individually tailored advice from a dietitian is more effective in improving diet quality and achieving reductions in BMI. However, as no dietary advice was provided to the attention control group, it is not known whether improvement in diet quality could have been achieved with a less intensive intervention such as a single session with a dietitian or through written information provided by a GP or practice nurse.

#### 5.4.5 Implications for Practice

The results of this study further support the most recent review of exercise interventions for adults with clinical depression that found a short-term benefit of exercise on depression scores (Krogh et al., 2011). Physical activity interventions are effective at increasing self-reported levels of physical activity in the short term (Hillsdon et al., 2005) and GP-prescribed individually tailored physical activity has also been effective at increasing physical activity levels during the study period (Grandes et al., 2011).

A review of the evidence for behaviour change techniques (van Achterberg et al., 2011) suggests that self-monitoring of behaviour, risk communication and use of social support are the most effective techniques to include in behaviour change programs, and that providing knowledge, materials and professional support is insufficient for patients to accomplish change. As such, it is likely that a variety of program modalities may be effective in eliciting behaviour change. Telephonic and

online interventions are methods of program delivery that are increasing in popularity and have been demonstrated to reduce symptoms of depression (Christensen et al., 2004; Mackinnon et al., 2008; Piette et al., 2011) and increase physical activity levels or promote dietary changes (Irvine et al., 2011; Mailey et al., 2010; Piette et al., 2011; Vandelanotte, 2007; van den Berg, 2007; Webb et al., 2010). Our study demonstrates that behaviour change and improvements in mental health can be achieved, as it was in our control group, without professional consultations or provision of any advice or materials other than usual GP care.

#### 5.4.6 Limitations

Adherence to self-selected goals was not systematically assessed. Treatment compliance can predict outcomes (Mattson et al., 1998). In this case, outcome measures such as changes in nutrient intake, physical activity or fitness levels may indicate compliance, thus those participants who improved on these variables are most likely to have complied with their homework. Because both the attention control and the intervention groups improved on these variables over time, it is possible that members of the attention control group were also participating in increased levels of physical activity or adopting new dietary changes during the control period. This spontaneous activity may have occurred as a result of referral to the program, extensive assessment of diet and exercise factors and participant expectations that some intervention had been initiated and would lead to change.

Physical activity levels and Healthy Eating scores of participants in this study were greater than those of the general population at baseline (as described in chapters 4 and 5). As such, there was less 'room for improvement' in this study population, and even small changes, which may be too small to demonstrate significance in a population of this size, would indicate a considerable improvement and greater alignment with the National Physical Activity Guidelines and the Australian Dietary Guidelines. Similarly, levels of depression, anxiety and stress were mild in this study population, and small changes may be particularly meaningful as participants move from mild to normal levels of depression, anxiety and stress as measured on the DASS-21.

While not statistically significant, there were substantial differences between the groups at baseline which may also have impacted on the findings. The intervention group had lower DASS scores and higher Aust-HEI scores at baseline, suggesting that they had lower levels of symptoms of depression and anxiety, and better quality diets. As such, they would have less room for improvement on these measures at follow-up. Reason for referral was also identified to be a moderating factor for changes in physical activity, and the intervention group had more than twice as many participants referred with anxiety ( $n=13$ ) as the attention control group ( $n=6$ ). It is possible that participants with higher levels of anxiety may have experienced greater perceived barriers to behaviour change as described earlier in this discussion.

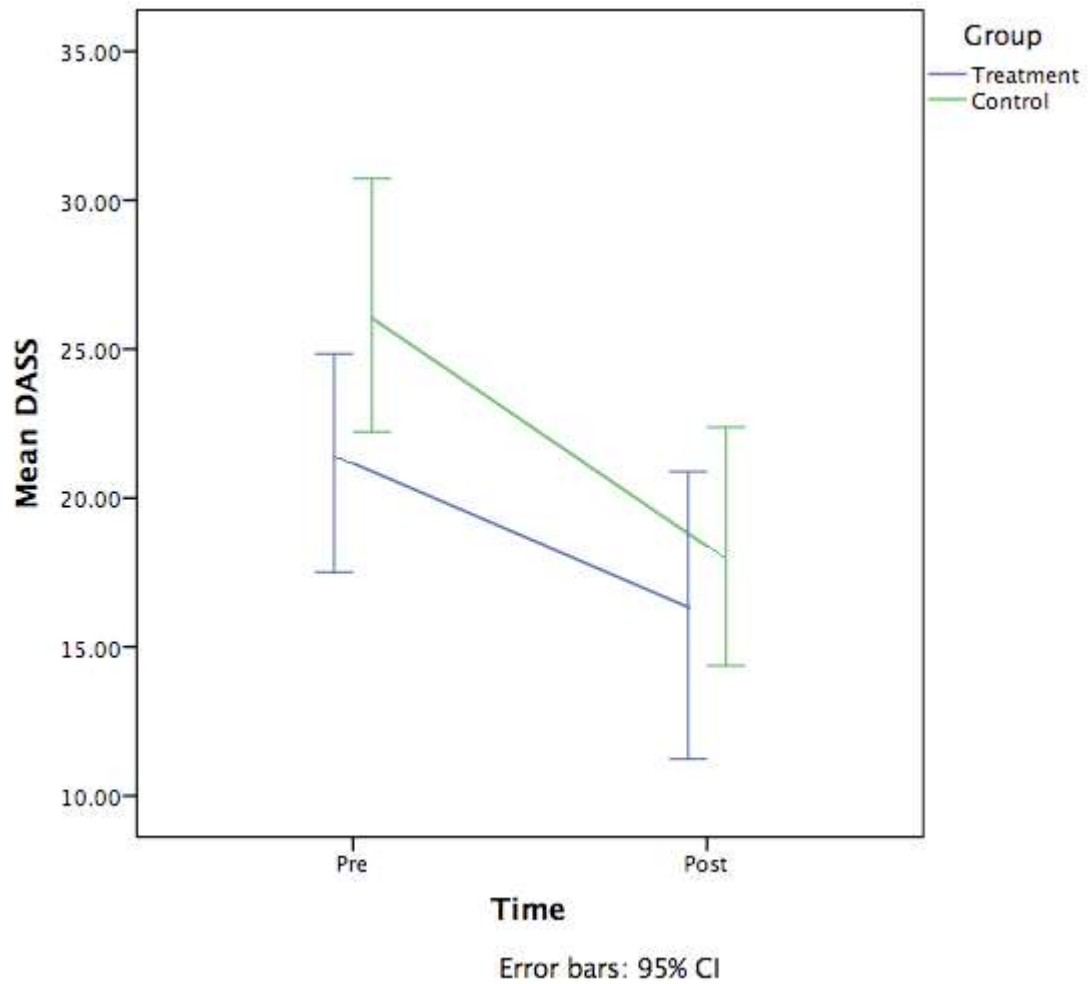
There was a high, but not unexpected, rate of attrition in this study, with only 64% of participants completing the study protocol. This is similar to the rate of completion in other trials involving participants with mental illness (Dimidjian et al., 2006; White et al., 2010). This was a limitation of the study, however missing data was able to be inferred through the use of the linear mixed model and multivariate analyses.

## **5.5 Conclusion**

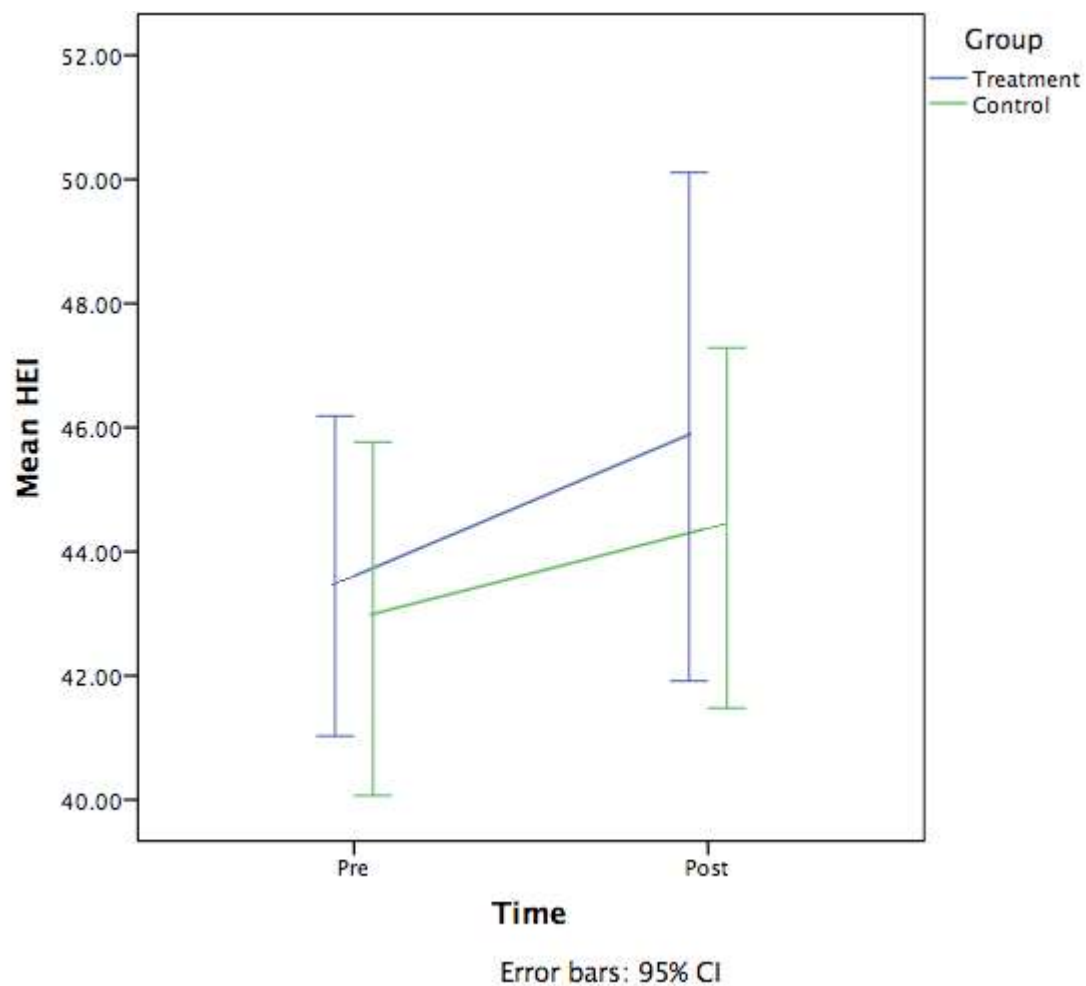
A formal diet and physical activity intervention for patients with depression and anxiety, such as that described in this study, can be successful in reducing depression and anxiety scores, and improving their physical fitness and diet quality. However, such an approach is not essential to effect lifestyle behaviour change in primary care patients being treated for depression and/or anxiety. The control group participants in this study improved their mental health, fitness and physical activity and dietary patterns to a similar extent as program participants. This may be reflective of other factors such as a readiness to change, receiving concurrent pharmacotherapy or psychotherapy, being held accountable with regular phone calls, or participating in an extensive assessment of diet and physical activity. Based on these findings, it is likely that other program modalities



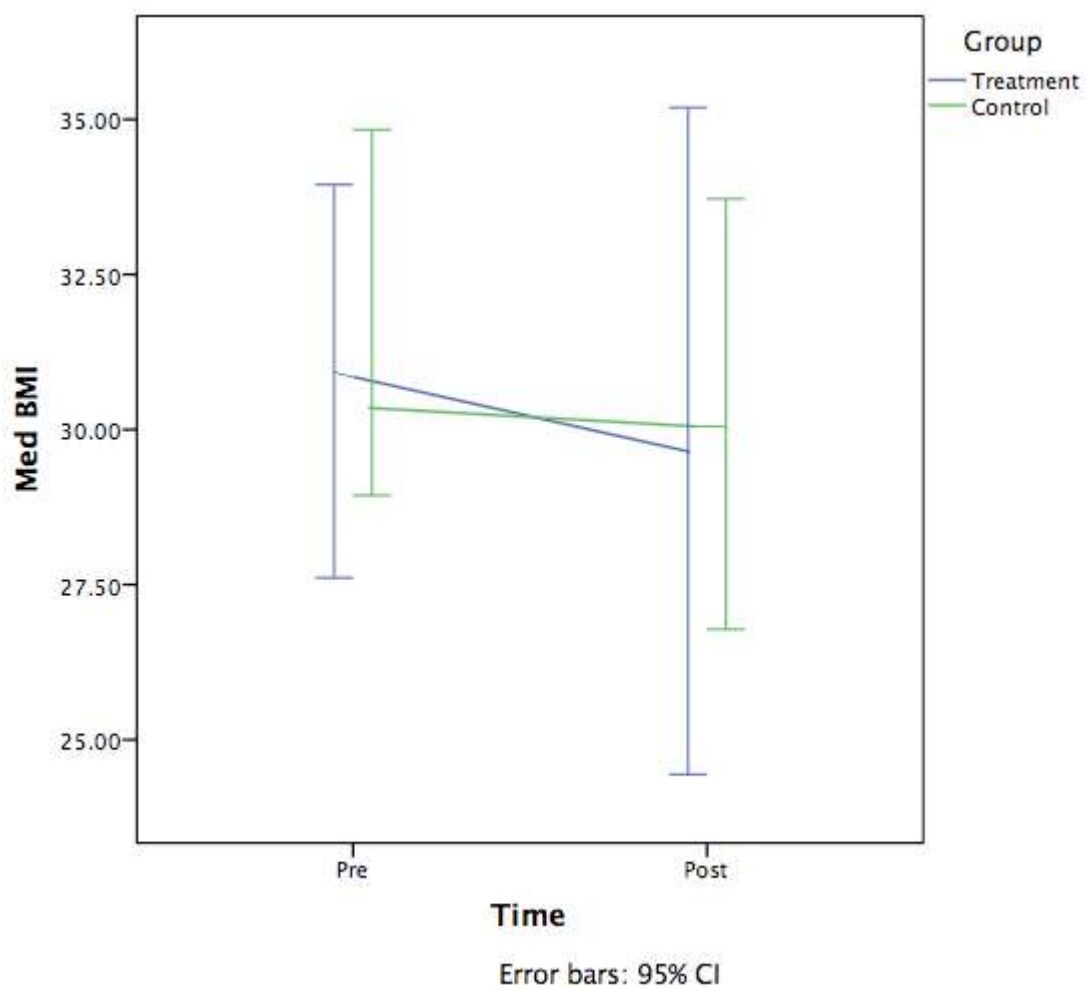
such as telephonic and online services could provide similar benefit to more intensive face-to-face individualised programs.



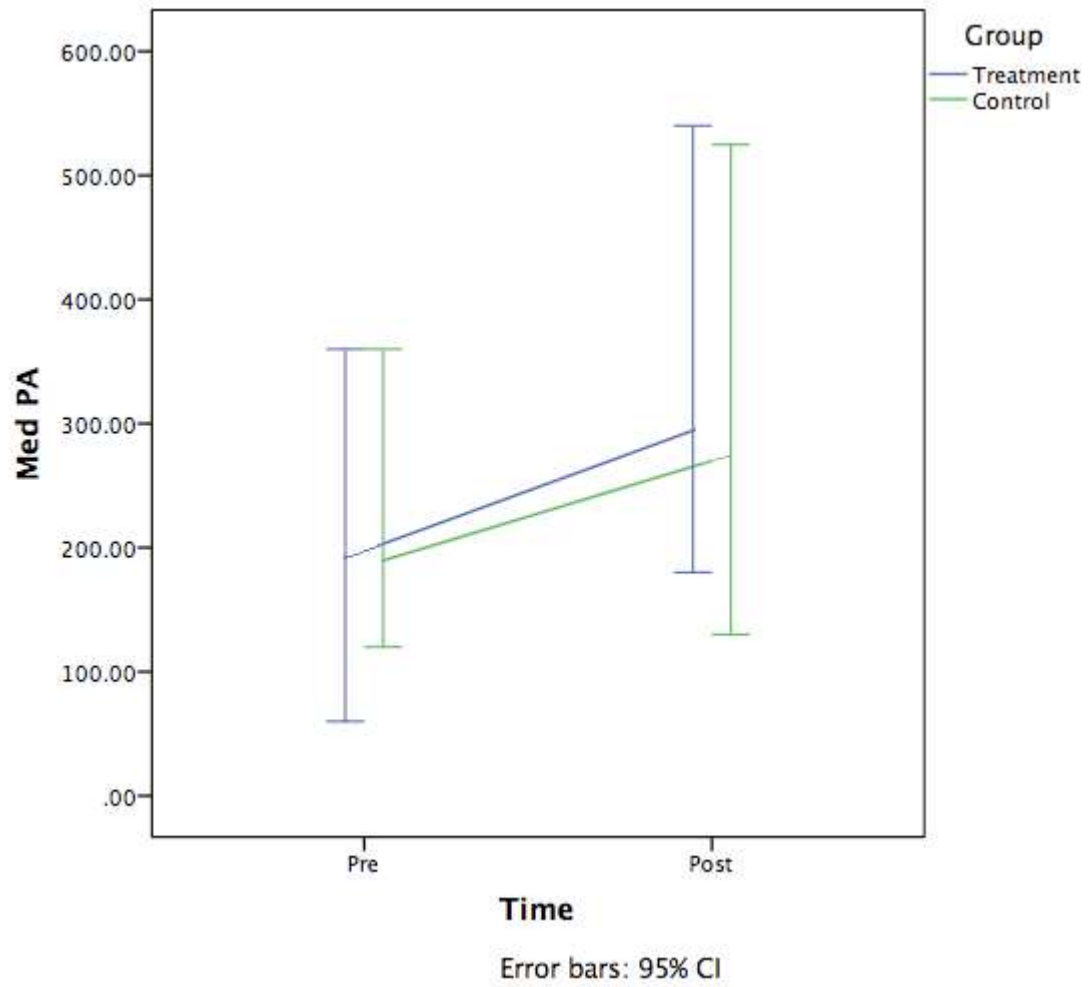
**Figure 5-2 Change in mean DASS score from baseline to completion.**



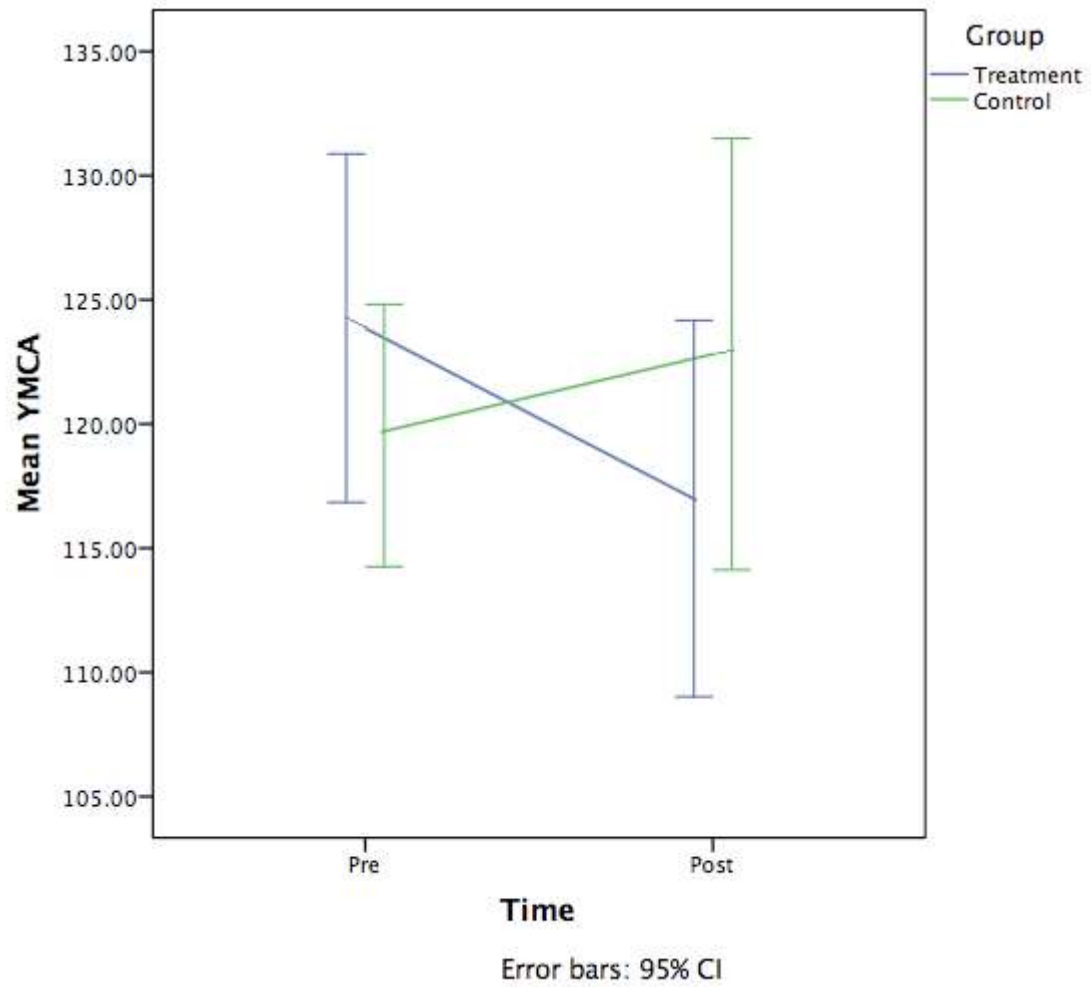
**Figure 5-3 Change in mean Australian modified Health Eating Index score from baseline to completion.**



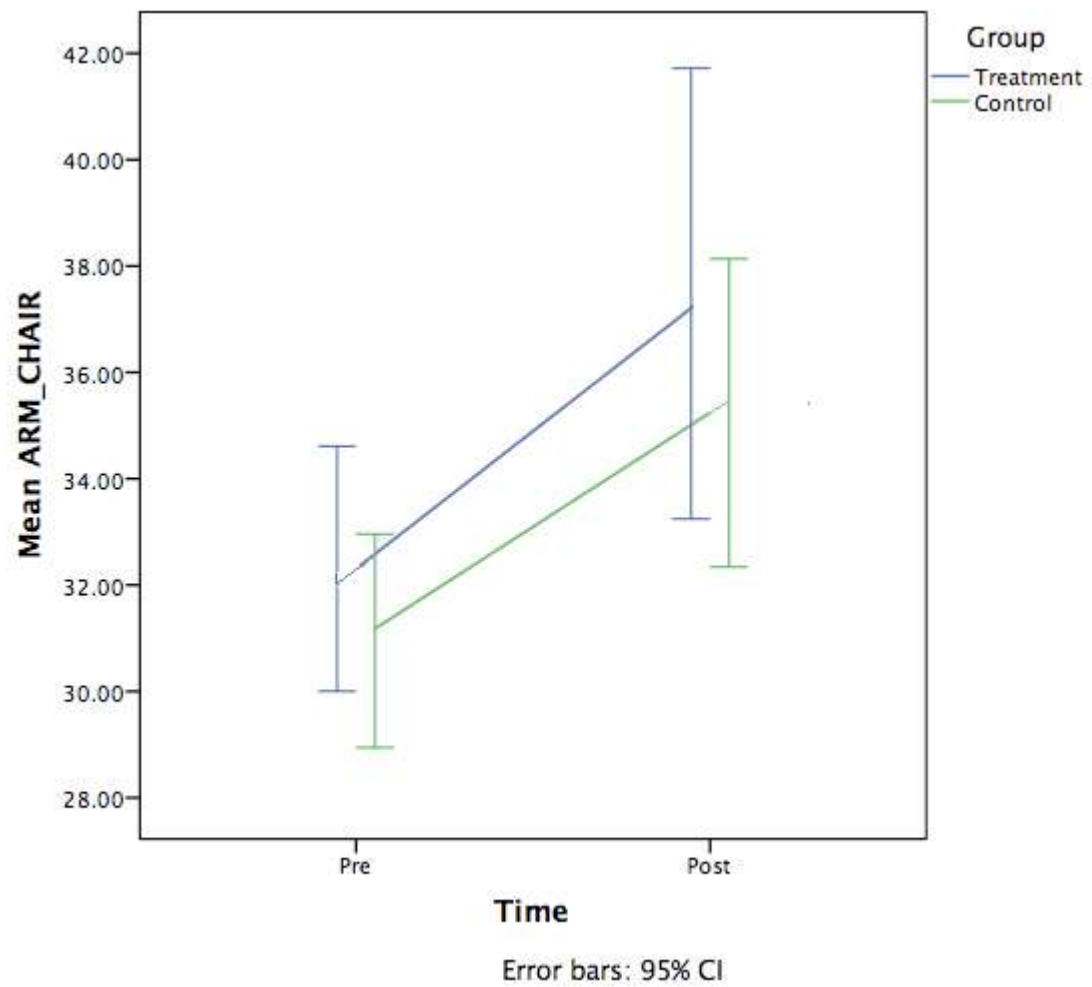
**Figure 5-4 Change in median Body Mass Index (kg.m<sup>-2</sup>) from baseline to completion.**



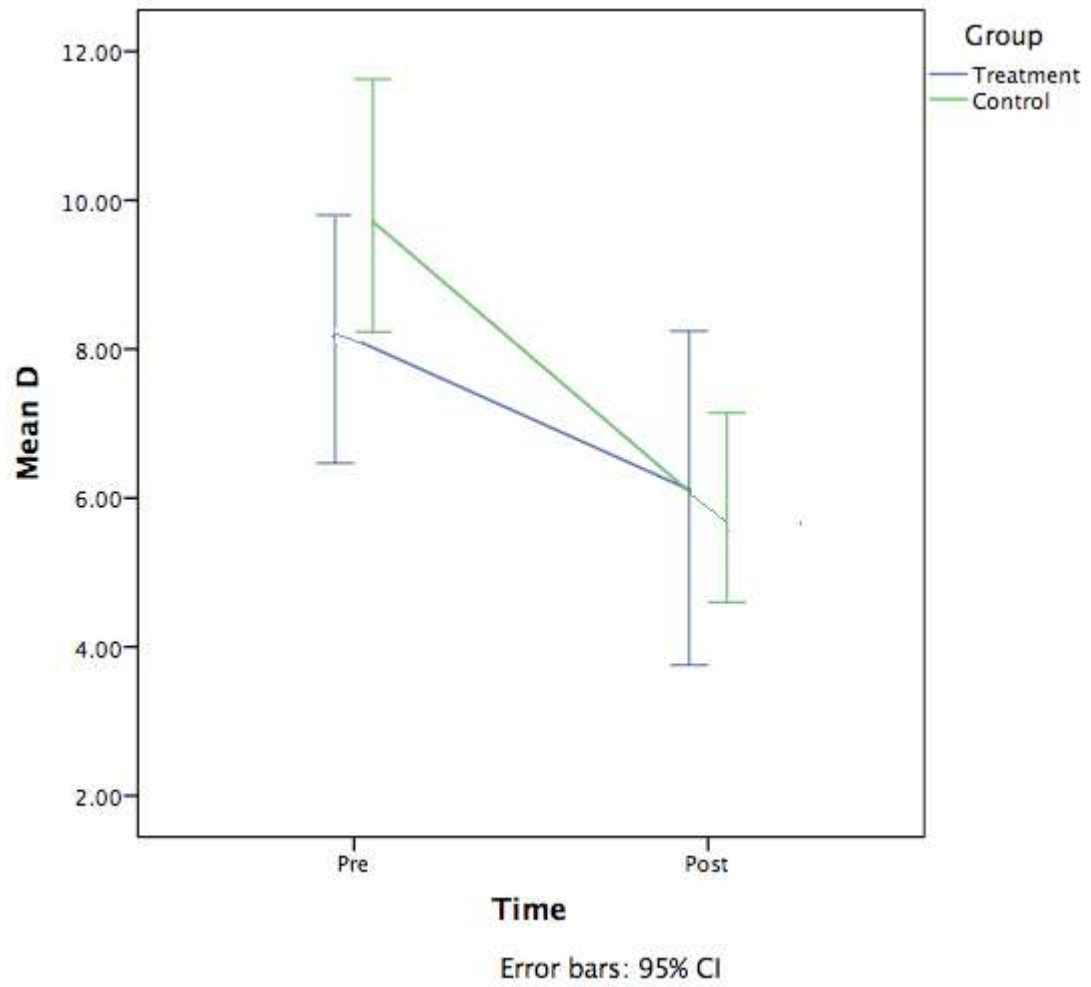
**Figure 5-5 Change in median physical activity level (minutes per week) from baseline to completion.**



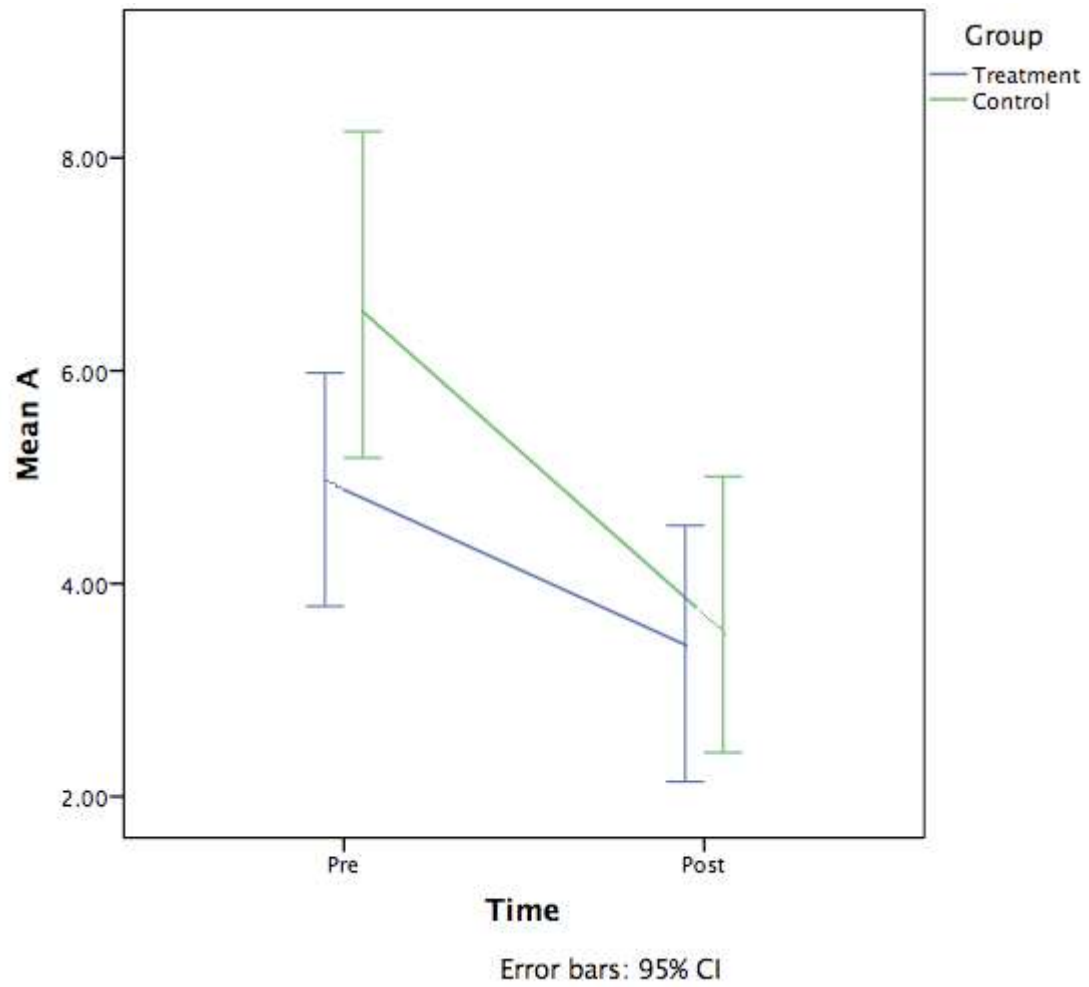
**Figure 5-6 Change in mean aerobic fitness level (post-test HR) from baseline to completion.**



**Figure 5-7 Change in mean muscular endurance level (arm curls + chair stands) from baseline to completion.**

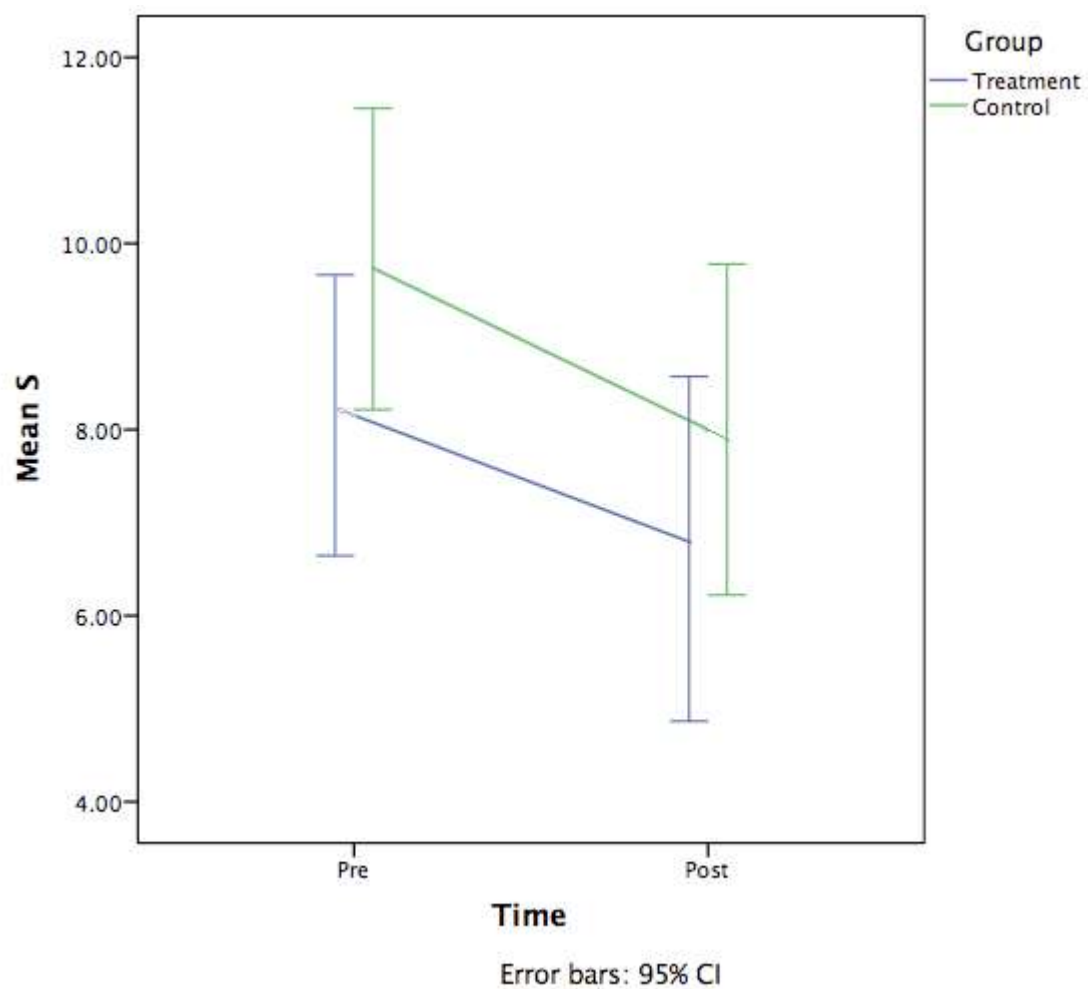


**Figure 5-8 Change in mean depression score (DASS subscale) from baseline to completion.**

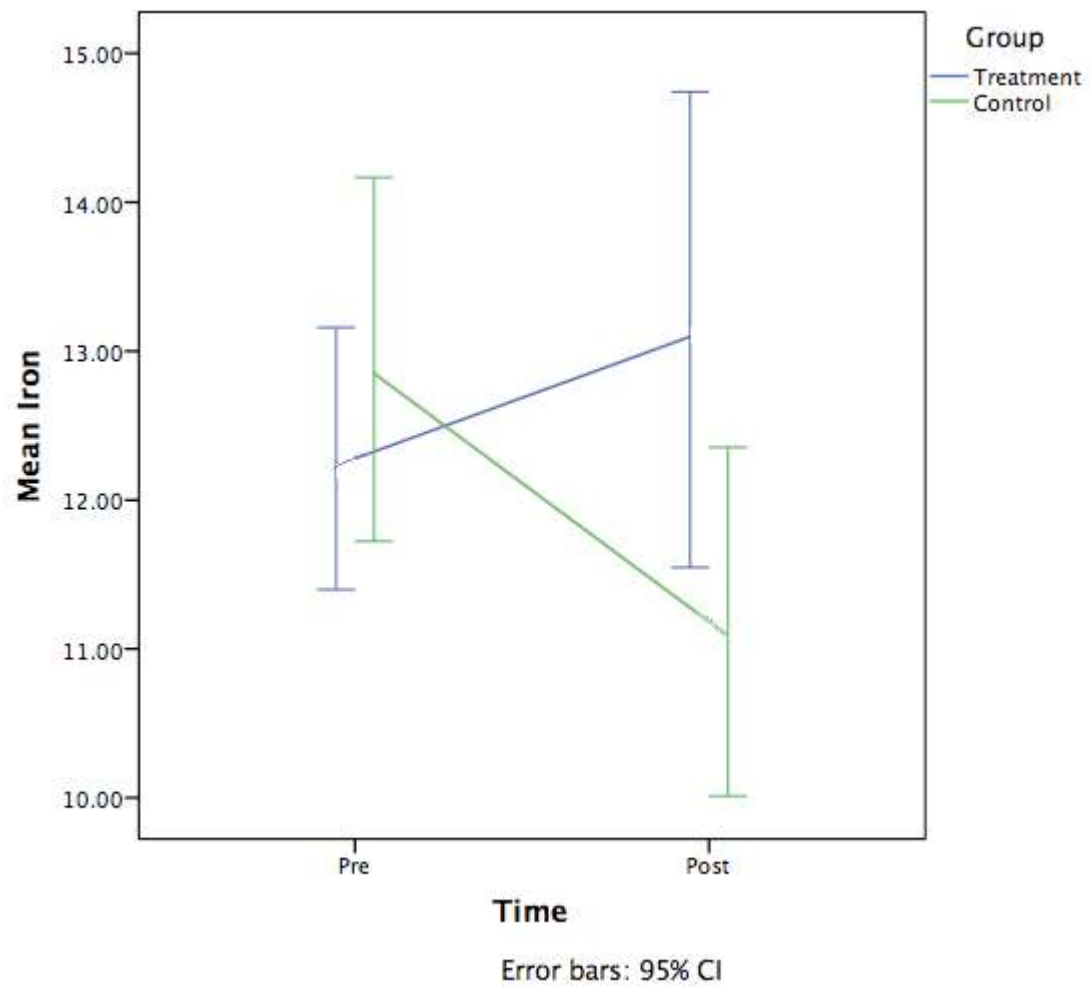


**Figure 5-9 Change in mean anxiety score (DASS subscale) from baseline to completion.**

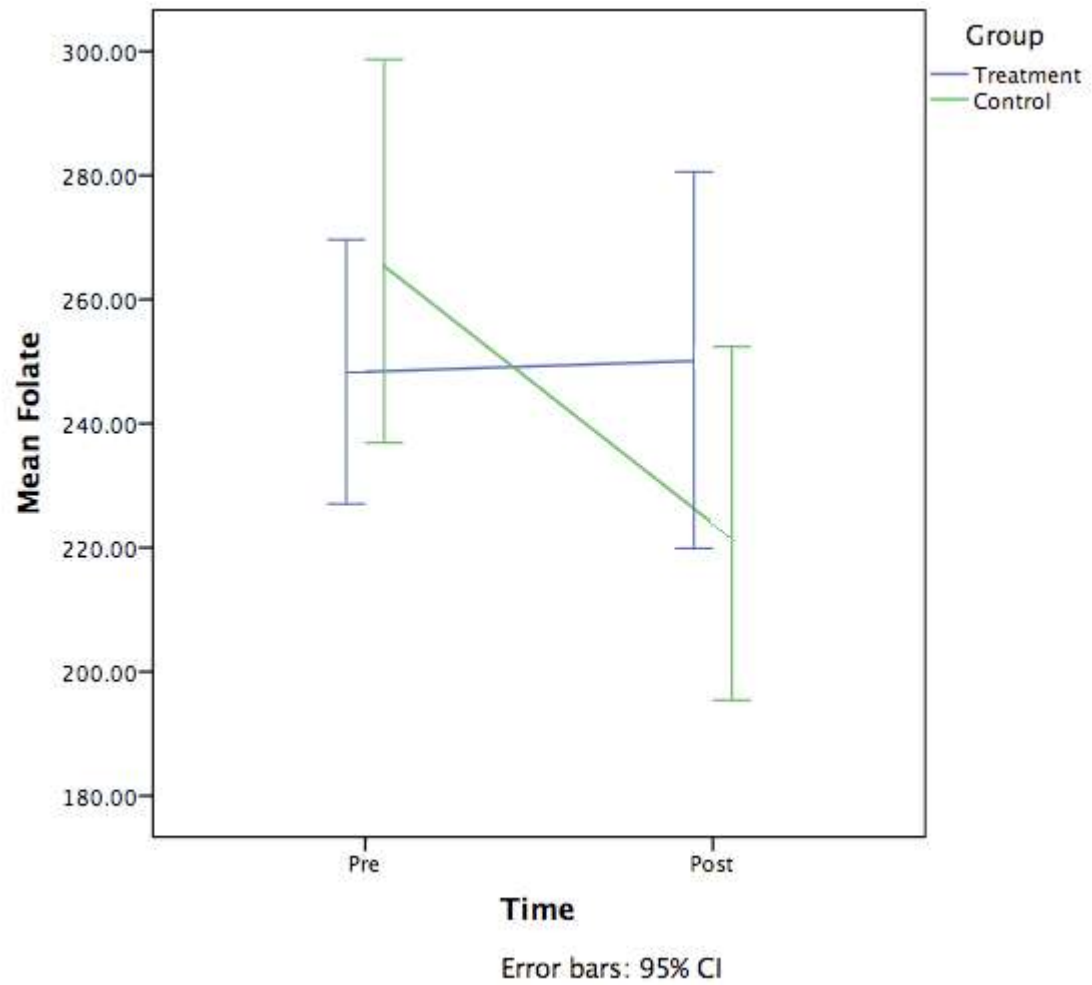




**Figure 5-10 Change in mean stress score (DASS subscale) from baseline to completion.**



**Figure 5-11 Change in mean iron intake (mg) from baseline to completion.**



**Figure 5-12 Change in mean folate intake (ug) from baseline to completion.**

## CHAPTER 6 CONCLUSION

This research aimed to evaluate the feasibility and effectiveness of individual lifestyle counseling for primary care patients with depression and/or anxiety. This research was unique as it aimed to apply known principles (i.e. increases in physical activity to achieve improvements in mental health) in naturalistic rather than clinical settings. To the best of our knowledge, it was also the first study to trial a dietary intervention in a primary care setting for patients with depression and/or anxiety. Research in a naturalistic setting has several inherent limitations, such as responder bias, high rates of attrition, diversity in patients' mental health conditions and other forms of treatment, and greater restriction on the types of tools that are available to use. However, these limitations are reflective of usual practice in primary care and this type of research is important to develop a pragmatic evidence base for allied health practice in primary care.

### 6.1 Baseline characteristics

The dietary intake of primary care patients with depression and/or anxiety was demonstrated to be poor, but similar to the general population. Magnesium intake (a nutrient with existing links with depression) was found to be inversely associated with depression levels.

This study has demonstrated that primary care patients with depression and/or anxiety spend as much time in physical activity as the general population, however, they spend less time in vigorous physical activity. Not surprisingly, the fitness levels of these individuals tended to be below the corresponding population norms. In this group, physical activity, but not fitness level, was associated with level of depression.

As both the nutrient intakes and physical activity levels of patients with depression and/or anxiety were found to be poor, but similar to the general population, it would be prudent for GPs to screen these patients' diet and physical activity levels and make recommendations based on the Australian Guide to Healthy Eating (Smith et

al., 1998) and the National Physical Activity Guidelines (Department of Health & Ageing, 2004).

## **6.2 Efficacy**

Both patients participating in the lifestyle intervention, and those participating in the attention control group achieved improvements in their physical activity, fitness levels, diet quality and mental health. It is hypothesised that the control group was stimulated to make changes to their physical activity patterns by adopting simple exercises such as walking, as a result of volunteering to participate in the program. However, intakes of key depression-related nutrients iron and folate differed between the groups, with intake improving over time in the intervention group and reducing over time in the control group. This suggests that while individuals are able to adopt simple lifestyle changes such as walking and reducing portion sizes, they may require professional assistance with the adoption of more complex dietary changes, or to address underlying medical conditions when increasing physical activity levels. Where GPs identify patients with depression and/or anxiety with poor dietary habits or low levels of physical activity, it is recommended that they refer their patient to a dietitian or exercise physiologist for expert professional support.

## **6.3 Feasibility**

Both GPs and patients reported satisfaction with the structure of the program, suggesting that it is an appropriate model for practice. This is further supported through the financial rebate that would be available to patients participating in the Enhanced Primary Care Scheme (Newland & Zwar, 2006). Components of the program that patients found most helpful were encouragement, motivation and support, goal setting and reviewing, and provision of sought after information. Appropriate training for program staff is important to consistently and effectively adopt principles of motivational interviewing and activity scheduling.

#### **6.4 Recommendations for practice**

General practitioners should regularly screen the dietary intake and physical activity of their patients with depression and/or anxiety. The Australian Guide to Healthy Eating (Smith et al., 1998) and the National Physical Activity Guidelines (Department of Health and Ageing, 2004) are useful resources for patients requiring simple lifestyle changes. Those requiring more complex modifications, or support and consideration for other medical conditions, should be referred to an Accredited Practising Dietitian or Accredited Exercise Physiologist. These professionals should seek opportunities for training and support with motivational interviewing and activity scheduling.

#### **6.5 Recommendations for future research**

The findings presented here give rise to several further questions for future research. First, replication of this study on a larger scale would allow for further analysis into the factors which determined participants' success, such as specific lifestyle goals selected, adherence to these goals, or participation in other treatment modalities. Lifestyle interventions are conducted in a variety of settings. Evaluation of both existing and new interventions for people with depression and/or anxiety conducted in their naturalistic settings would begin to develop an evidence base of both the type and setting of effective interventions.

This study has highlighted consistently poor nutrient intakes and dietary patterns for patients with depression and/or anxiety. Dietary intervention studies of both specific nutrients and dietary patterns in groups with mild, moderate or severe depression and/or anxiety would contribute to developing a body of knowledge around effective nutrition therapy for depression and anxiety.

Both the attention control and intervention groups in this study improved their mental health by making relatively small changes in their physical activity patterns. Physical activity trials evaluating small increases in physical activity would provide

insight into whether changes that are realistic for most patients with depression and/or anxiety are beneficial for their mental health.

Finally, given the challenges associated with recruiting and retaining patients with depression and/or anxiety in lifestyle interventions, studies evaluating the success and cost-effectiveness of emerging behaviour change program modalities including telephonic and online services are warranted. Furthermore this study did not attempt to assess the cost-benefit of this model of intervention with alternatives, such as usual GP practice or less intensive modes of education and support. The improvements in the mental health outcomes in the control group in this study suggest such research would be warranted.

## **6.6 Concluding remarks**

The primary aim of this study was to determine whether counseling from a dietitian and exercise physiologist in primary care could improve recovery (mental health outcomes) of patients with depression and anxiety and would be an acceptable mode of treatment by clients and referring doctors. Both of these aims were met, as patients referred demonstrated significant improvements in mental health outcomes, and positive feedback regarding the program structure was received from both participants and referring doctors. The results of this study support two of the five hypotheses; patients with depression and anxiety are less fit than the general population (hypothesis 2), and key stakeholders have provided feedback to suggest that counseling from a dietitian and exercise physiologist is a feasible and sustainable intervention (hypothesis 5). Study patients had similar nutrients intakes (hypothesis 1) and levels of participation in physical activity (hypothesis 3) as the general Australian population, although this is more a reflection on the poor diet and physical activity levels of the Australian population rather than good dietary and physical activity practices for patients with depression and anxiety. Patients receiving usual GP care improved their mental health similarly to patients receiving counseling from a dietitian and exercise physiologist (hypothesis 4), which supports the need for future research regarding other modes of education and support.

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## APPENDIX A: GP PROMOTIONAL MATERIALS

Presentation to GPs (June 2005)

### Diet, exercise and mental health: Applications in primary care



Adrienne Forsyth  
PhD Candidate  
University of Wollongong  
7 June 2005



### Objectives

- To highlight the role of dietitian and exercise physiologist (DEP) services in mental health
- To provide examples of the benefits and mechanisms for improvement of mental health through diet and exercise
- To demonstrate how DEP services can be incorporated into primary care
- To evaluate interest in obtaining DEP services for mental health patients in primary care





## Key Findings (Nutrition)

- Nutrient deficiency → depression
  - Eg. folate, iron, thiamin, vitamin B<sub>12</sub>
- Conditions associated with depression
  - Poor omega-3 fatty acid status
  - Obesity
- Healthy eating assists in recovery from substance abuse
- No known effective interventions to improve nutrition in patients with mental illness



## Key Findings (Physical Activity)

- Patients with mental illness are unfit
- Physical inactivity predicts depression
- ↑ Physical activity
  - Can prevent or ↓ depression and anxiety
- Physical activity is as effective as:
  - Pharmacotherapy in treating depression
  - Meditation or relaxation in treating anxiety
- Controversy regarding optimal type, intensity, duration and frequency
  - Tailored interventions may be most promising



## Effects of Exercise Training on Older Patients with Major Depression

Blumenthal et al., 1999

### ➤ Subjects

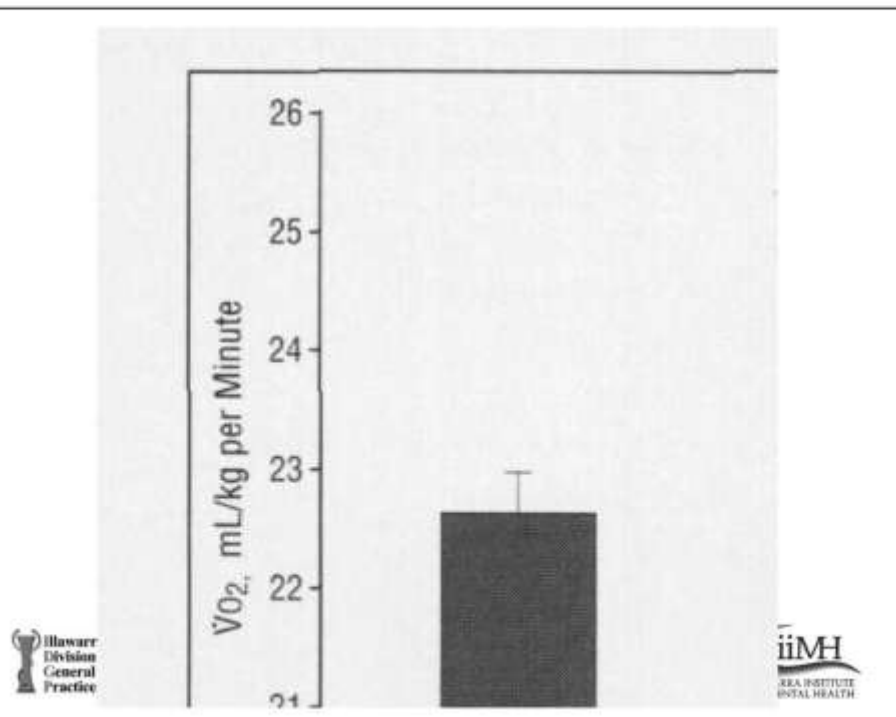
- 156 men and women with MDD
- Nil current exercise or antidepressants

### ➤ 16-Week Intervention

- Exercise: 3 x 45 minute supervised sessions / week
- Medication: Zoloft
- Combination exercise and medication

### ➤ Results

- Fitness improved in exercise and combination groups
- Depression declined significantly in all groups
- Response time faster with medication



## ***Proposed Mechanisms***

- **Biochemical**
  - Eg. Beta endorphin and central serotonin
- **Physiological**
  - Eg. Neurotransmitter efficiency
- **Psychological**
  - Eg. Self-efficacy and social interaction



## **Mental Health in Illawarra Practices**

- **Over 30% of patients present with mental illness and/or substance misuse**
- **Treatment:**
  - 12-77% Pharmacological
  - 58-76% Psychological
  - 33-39% Treatment for physical health



## Mental Health in General Practice

- **Primary care is the ideal place to target patients with mental illness**
  - Familiar surrounds
  - GP developed rapport with patients
  - GP has more general knowledge about patients and their circumstances
  - Pt developed strategies to attend appointments at the practice
    - Transportation
    - Childcare
    - Time away from employment



## Putting it into practice

- **Similar to 'Better Outcomes in Mental Health' project and Diabetes Exercise project**
- **Free service**
- **Based in GP rooms**
- **External location available where required**
- **Referral from GP**
- **1. Feasibility pilot study**
  - 1 assessment and 2 individual consultations over 2-3 months
- **2. Intervention study**
  - 2 Assessments and 4 individual consultations over 6 months
- **Follow-up at 12 and 18 months**
- **Care plan if desired**



## Questions

- Advantages to your practice?
- Barriers?



## For further information...

**Adrienne Forsyth**  
**Illawarra Institute for Mental Health**  
**Building 22**  
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**Wollongong NSW 2522**  
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### GP sign-up sheet (June 2005)

I am interested in learning more about how a dietitian and exercise physiologist can help improve the mental health of my patients.

Name

Telephone number

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

## Questionnaire distributed to GPs (June 2005)



Please take a moment to answer to following questions.

1. Do you currently have a dietitian or exercise physiologist in your practice?  
☐ yes                      ☐ no
2. Do you regularly refer to a dietitian or exercise physiologist?  
☐ yes                      ☐ no
3. Do you feel that a dietitian and exercise physiologist intervention for mental health patients will be useful?  
☐ yes                      ☐ no
4. Are you currently using the clinical psychology service?  
☐ yes                      ☐ no
5. Are you participating in the exercise physiologist and diabetes study?  
☐ yes                      ☐ no
6. Are you interested in learning more about how a dietitian and exercise physiologist can help improve the mental health of your patients?  
☐ yes                      ☐ no
7. Are you willing to be contacted to learn more about how a dietitian and exercise physiologist can help improve the mental health of your patients?  
☐ yes                      ☐ no

Print Name \_\_\_\_\_

Telephone number \_\_\_\_\_

Best day and time to call \_\_\_\_\_

Thank you.

## **Results of GP questionnaires**

### **Southern GPs (14/15)**

One GP currently has a dietitian in practice. Four GPs regularly refer to dietitians; no GPs regularly refer to exercise physiologists. All of the GPs feel that a DEP intervention for mental health patients will be useful. Five GPs are using the clinical psychology service. Two GPs are participating in the exercise physiologist and diabetes study; these GPs are not using the clinical psychology service. Twelve GPs are interested in learning more about how a DEP can improve the mental health of their patients, and 13 are willing to be contacted.

### **Central GPs (17/36)**

Three GPs have a dietitian in practice, one has an exercise physiologist. Thirteen GPs regularly refer to dietitians or exercise physiologists. Sixteen out of 17 GPs that responded feel that a DEP intervention for mental health patients will be useful. Nine GPs are using the clinical psychology service. Four GPs are participating in the exercise physiologist and diabetes study; these GPs are also using the clinical psychology service. Sixteen GPs are interested in learning more about how a DEP can improve the mental health of their patients, and 14 are willing to be contacted.

### **Northern GPs (8/9)**

Four GPs have a dietitian in practice. Six GPs regularly refer to dietitians or exercise physiologists. All eight GPs that responded feel that a DEP intervention

for mental health patients will be useful. Four GPs are using the clinical psychology service. Three GPs are participating in the exercise physiologist and diabetes study; these GPs are also using the clinical psychology service. Seven GPs are interested in learning more about how a DEP can improve the mental health of their patients and are willing to be contacted.

#### Overall (39 GPs)

Nine GPs have a dietitian or exercise physiologist in practice. Twenty-three GPs regularly refer to dietitians or exercise physiologists. Thirty eight of 39 GPs that responded feel that a DEP intervention for mental health patients will be useful. Eighteen GPs are using the clinical psychology service, and nine GPs are participating in the exercise physiologist and diabetes study. Seven GPs are using both the clinical psychology service and participating in the exercise physiologist and diabetes study. Thirty five GPs are interested in learning more about how a DEP can improve the mental health of their patients, and thirty four are willing to be contacted.

## Pilot recruitment brief (September 2005)



### **Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care**

The pilot project *Feasibility of implementing tailored nutrition and physical activity interventions by a dietitian and exercise physiologist for patients with depression, anxiety and/or substance misuse in primary care* is now underway and patients are being sought to participate.

#### **Who qualifies for inclusion in this study?**

Patients currently being treated for depression, anxiety or substance misuse are eligible to participate in this study.

#### **What will the patients receive?**

- A free service, provided by an accredited practising dietitian and exercise physiologist.
- A 90-minute nutrition, physical activity and mental health assessment.
- One 60-minute initial consultation utilizing motivational interviewing to improve physical and mental health through nutrition and/or physical activity.
- One 30-minute review consultation building on behaviour change strategies initiated at the initial consultation.

#### **What will the GP receive?**

- A comprehensive report on participating patients' physical and mental health status.
- Documentation of patients' consultations with the dietitian and exercise physiologist.
- Recommendations for patient referral to other service providers for continued support in making nutrition and physical activity changes.

#### **What is required of the GPs?**

- Completion of a short referral form.
- Provision of a room on-site for assessments and consultations.

Only 20 patients will be accepted into the pilot study, so please indicate your interest as soon as possible by contacting:

Adrienne Forsyth  
 Illawarra Institute for Mental Health  
 Building 22, University of Wollongong  
 Wollongong, NSW 2522  
 Ph. 4221 5605  
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 Mob. 0422 737 070  
 E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

## GP recruitment flyer (February 2006)

 <p><b>ILLAWARRA INSTITUTE FOR MENTAL HEALTH</b></p>	<p><b>The AimHi Program:</b>  <b>Nutrition and Physical Activity Counselling for Patients with  Mental Illness in Primary Care</b></p>	 <p><b>Illawarra Division of General Practice</b></p>
<p>The pilot project <i>Feasibility of implementing tailored nutrition and physical activity interventions by a dietitian and exercise physiologist for patients with depression and/or anxiety in primary care</i> is now underway and patients are being sought to participate.</p> <p><b>Who qualifies for inclusion in this study?</b>  Patients currently being treated for depression or anxiety are eligible to participate in this study.</p> <p><b>What will the patients receive?</b></p> <ul style="list-style-type: none"> <li>• A free service, provided by an accredited practising dietitian and exercise physiologist.</li> <li>• A 90-minute nutrition, physical activity and mental health assessment.</li> <li>• One 60-minute initial consultation utilizing motivational interviewing to improve physical and mental health through nutrition and/or physical activity.</li> <li>• One 30-minute review consultation building on behaviour change strategies initiated at the initial consultation.</li> </ul> <p><b>What will the GP receive?</b></p> <ul style="list-style-type: none"> <li>• A comprehensive report on participating patients' physical and mental health status.</li> <li>• Documentation of patients' consultations with the dietitian and exercise physiologist.</li> <li>• Recommendations for patient referral to other service providers for continued support in making nutrition and physical activity changes.</li> </ul> <p><b>What is required of the GPs?</b></p> <ul style="list-style-type: none"> <li>• Completion of a short referral form.</li> <li>• Where possible, provision of a room on-site for assessments and consultations.</li> </ul> <p>Eligible patients will be accepted into the pilot project with immediate commencement until it has reached capacity. All remaining eligible patients will be contacted to participate in the subsequent program, with assessments taking place in autumn and winter 2006.</p> <p>If you would like to participate in this study, please complete and fax or mail back this form, or contact:</p> <p>Adrienne Forsyth  Illawarra Institute for Mental Health  Building 22, University of Wollongong  Wollongong, NSW 2522  Ph. 4221 5605  Fax 4221 5585  E-mail <a href="mailto:adrienne@uow.edu.au">adrienne@uow.edu.au</a></p>		
<p><b>Please complete and faxback to 4221 5585 by Friday 3 March 2006</b></p> <p><input type="checkbox"/> I would like to participate in this program</p> <p style="padding-left: 40px;"><input type="checkbox"/> I have a room available for consultations</p> <p style="padding-left: 40px;"><input type="checkbox"/> An external room is required for consultations</p> <p><input type="checkbox"/> I would like more information regarding this program before participating</p> <p>Name/Stamp: _____</p> <p>Practice Address: _____</p> <p>Phone: _____</p> <p>Fax: _____</p> <p>E-mail: _____</p> <p>My preferred mode of contact is:</p> <p><input type="checkbox"/> Phone      Best day and time to call: _____</p> <p><input type="checkbox"/> Fax</p> <p><input type="checkbox"/> Mail</p> <p><input type="checkbox"/> E-mail</p> <p>Alternatively, mail to:  Illawarra Institute for Mental Health  Building 22, University of Wollongong  WOLLONGONG NSW 2522</p>		



**Presentation to GPs (July 2006)**

# **The AIMhi Program: Nutrition and Physical Activity Counseling for Patients with Mental Illness**



**Adrienne Forsyth**

Accredited Practising Dietitian

Accredited Exercise Physiologist

PhD Candidate, Illawarra Institute for Mental Health



## **AIMhi**



- **Adults currently being treated for:**
  - Depression
  - Anxiety
  
- **6 visits to the dietitian / exercise physiologist over 6 months**
  - 2 assessments
  - 4 consultations



## AIMhi



- **Immediate treatment**
  
- **Delayed treatment**
  - 6 month wait
  - Monthly phone contact



## AIMhi



- **Assessments**
  - Mental health
  - Anthropometry
  - Fitness
  - Nutrition



## AIMhi



### ➤ Consultations

- Motivational interviewing
- Individually tailored nutrition and physical activity counseling
- Common programs
  - Improving diet quality
  - Walking
  - Home exercise programs



## AIMhi



- Commencing September 2006
- 100 patients
- No cost
- 1-page referral
- Appointments:
  - At your surgery
  - Central location in Wollongong




# AIMhi




- **How to participate**
  - **Pick up GP package**
  - **Fax in interest form**
  - **Fax referrals**

## Presentation to GPs (October 2006)



Illawarra  
Division of  
General  
Practice



iiMH  
ILLAWARRA INSTITUTE  
FOR MENTAL HEALTH

### The AIMhi Program: Nutrition and Physical Activity Counseling for Patients with Mental Illness

Adrienne Forsyth  
Accredited Practising Dietitian  
Accredited Exercise Physiologist  
PhD Candidate, Illawarra Institute for Mental Health

## AIMhi

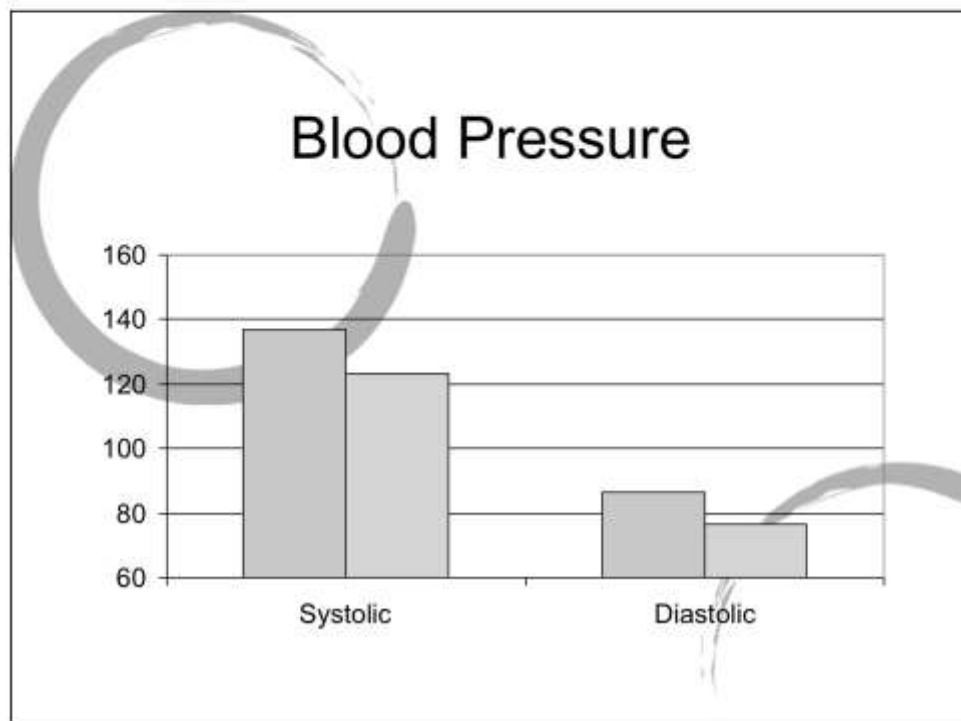
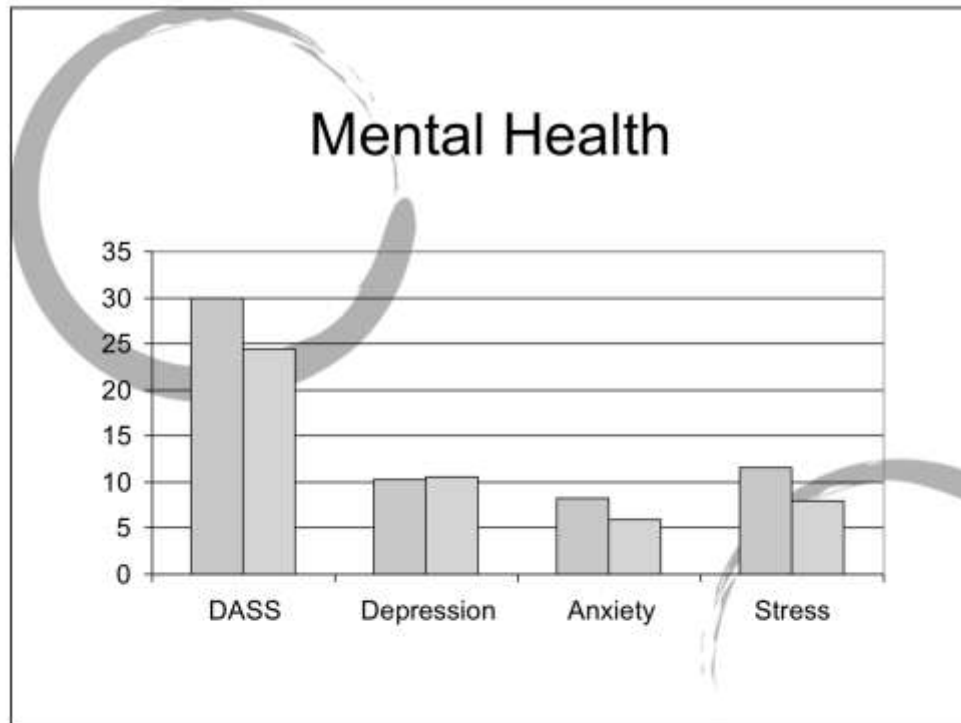
- Adults currently being treated for:
  - Depression
  - Anxiety
- 6 visits to the dietitian / exercise physiologist over 12 weeks
  - 2 assessments
  - 4 consultations

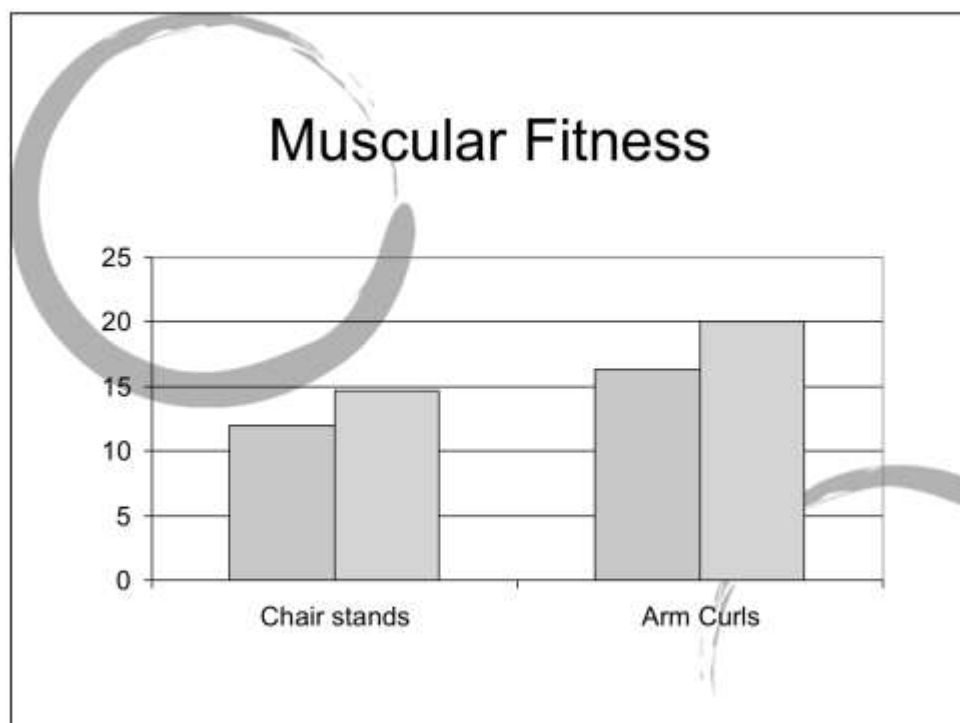
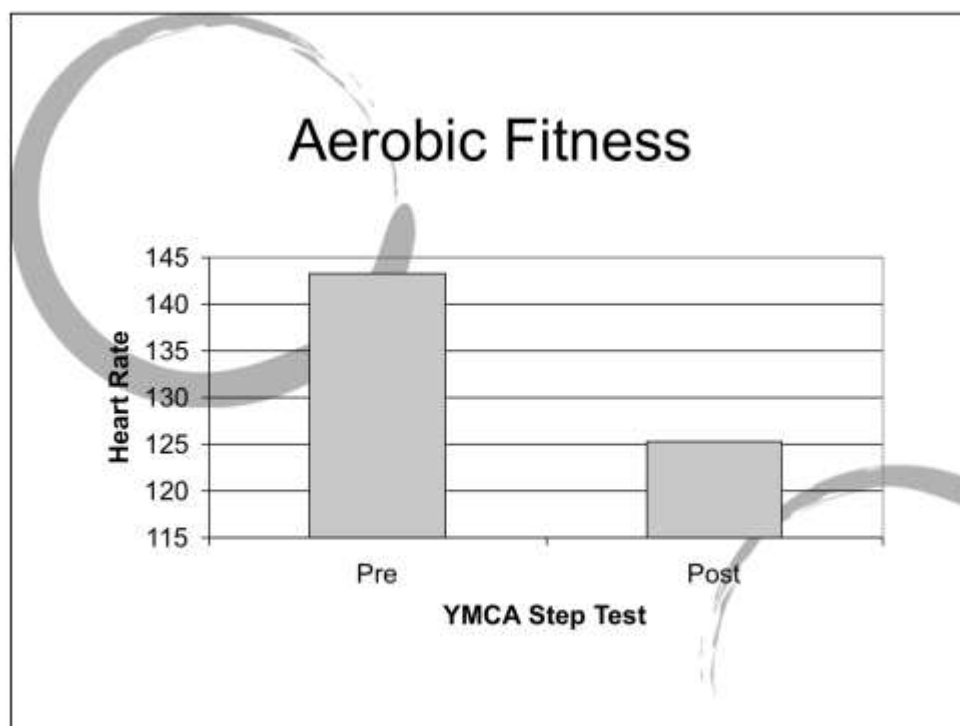
## AIMhi Pilot: Baseline Data

	Depression	Anxiety	Stress
<b>Range</b>	2-20	1-14	4-19
<b>Mean</b>	10.4	7.2	9.4
<b>Description</b>	moderate	moderate	mild

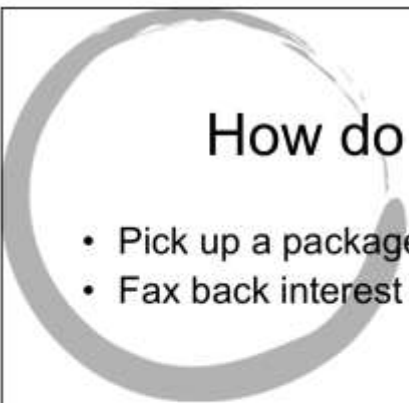
## AIMhi Pilot: Baseline Data

Nutrient	% not meeting RDI	Key groups with poor intake
Thiamin	5.6	
Niacin	5.6	
Protein	11.1	M>70
Riboflavin	11.1	
Phosphorus	16.7	F
<b>Vitamin C</b>	22.2	
Magnesium	33.3	
Iron	33.3	F<50
Zinc	33.3	
<b>Vitamin A</b>	50.0	
Calcium	55.6	F<30
Folate	66.7	F<50, M>70
Potassium (AI)	94.4	









## How do I participate?

- Pick up a package tonight
- Fax back interest form and referrals


Adrienne Forsyth

Phone 4221 5605

Mobile 0406 914 541

E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

Fax 4221 5585



## Notice of main study commencement (August 2006)



University of Wollongong  
Northfields Avenue  
Wollongong NSW 2522

Practice Name  
Address  
Suburb NSW Post Code

Date

Dear Dr. \_\_\_\_\_,

Thank you for referring your patients to the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care. Recruitment for the pilot study has now ceased.

We are now accepting referrals for the main study. To refer, simply use the attached referral forms. These differ slightly from the old forms due to an ethics requirement. **Please discard any old unused referral forms.**

There will be a few minor changes with the main study, as listed below:

1. To enhance patient compliance, **consultations will now be held more frequently**. Patients will still receive two assessments and four consultations. These will now be held over approximately 3 months rather than over 6 months.
2. For scientific purposes, approximately **half of the patients you refer will be placed in a delayed treatment group**. They will have an assessment immediately, and begin the program approximately 3 months later. During the waiting period, regular telephone contact will be made with your patients.

### Participation now requires the following steps:

1. Identify an adult patient that you are currently treating for depression or anxiety.
2. Discuss the AIMhi program with your patient, and assess your patient's understanding of the program.
3. Complete the referral form and fax to 4221 5585.

I look forward to your continued participation in the AIMhi Program. Should you have any questions about the program, or your patients' participation in the program, please do not hesitate to contact me.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
T 4221 5605 F 4221 5585 M 0406 914 541  
adrienne@uow.edu.au

## Information sheet with faxback (May 2007)

 <p><b>iiMH</b> ILLAWARRA INSTITUTE FOR MENTAL HEALTH</p>	 <p><b>The AIMhi Program:</b> <b>Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care</b></p>
<p>The AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care is evaluating the benefits of nutrition and physical activity counselling for patients with depression and anxiety. The program began in September 2006. Referrals are continuing to be accepted.</p> <p><b>Who qualifies for inclusion in this program?</b> Patients currently being treated for depression or anxiety are eligible to participate in this program.</p> <p><b>What will the patients receive?</b></p> <ul style="list-style-type: none"> <li>▪ A free service, provided by an accredited practising dietitian and exercise physiologist.</li> <li>▪ A 90-minute nutrition, physical activity and mental health assessment, before and after the program.</li> <li>▪ One 60-minute initial consultation utilizing motivational interviewing to improve physical and mental health through nutrition and/or physical activity.</li> <li>▪ Three 30-minute review consultations building on behaviour change strategies initiated at the initial consultation.</li> </ul> <p><b>What will the GP receive?</b></p> <ul style="list-style-type: none"> <li>▪ A comprehensive report on participating patients' physical and mental health status.</li> <li>▪ Documentation of patients' consultations with the dietitian and exercise physiologist.</li> <li>▪ Recommendations for patient referral to other service providers for continued support in making nutrition and physical activity changes.</li> </ul> <p><b>What is required of the GPs?</b></p> <ul style="list-style-type: none"> <li>▪ Completion of a short referral form.</li> <li>▪ Where possible, provision of a room on-site for assessments and consultations. Rooms are also available at the Northfields Clinic at the University of Wollongong.</li> </ul> <p>To effectively evaluate this program, a wait list control is required. Approximately half of the patients you refer will be placed in a delayed treatment group, to commence the program 3-months after being referred. Patients receiving delayed treatment will be assessed immediately, then receive regular telephone contact until they commence the program.</p> <p>For more information, please contact:</p> <p>Adrienne Forsyth Illawarra Institute for Mental Health University of Wollongong NSW 2522 T 4221 5605 F 4221 5585 M 0406 914 541 E-mail <a href="mailto:adrienne@uow.edu.au">adrienne@uow.edu.au</a></p> <p><b>Please complete the following if you wish to have patients seen in your rooms. Otherwise, all patients will be seen at the University of Wollongong.</b></p> <p><input type="checkbox"/> Yes, I have a room available for patients' appointments. Please contact my practice manager to make arrangements.</p> <p><b>GP name:</b> _____</p> <p><b>Practice manager name:</b> _____</p> <p><b>Phone:</b> _____</p> <p><b>Fax:</b> _____</p> <p style="text-align: center;"><b>FAX BACK TO 4221 5585</b></p>	

**Presentation for GPs (March 2007)**

**The AIMhi Program:  
Nutrition and Physical Activity  
Counselling for Patients with Mental  
Illness**

**Adrienne Forsyth**

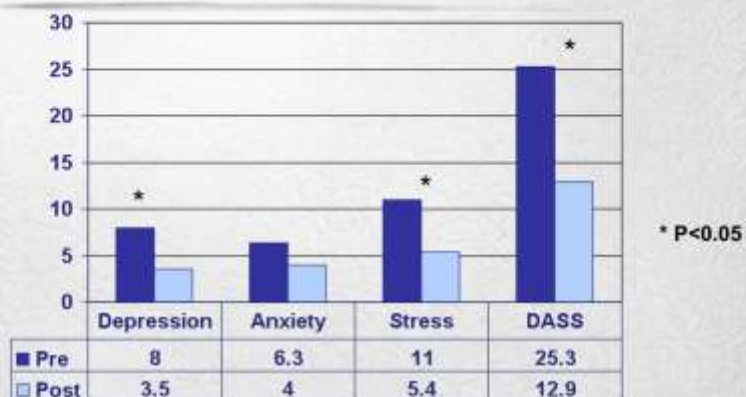
Accredited Practising Dietitian  
Accredited Exercise Physiologist  
PhD Candidate, iiMH



**AIMhi**

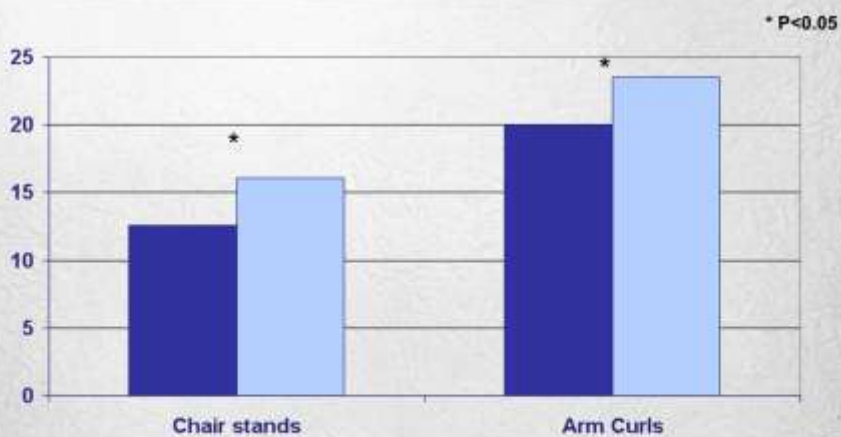
- Adults currently being treated for:
  - Depression
  - Anxiety
- 6 visits to the dietitian / exercise physiologist over 12 weeks
  - 2 assessments
  - 4 consultations

## Mental Health Results



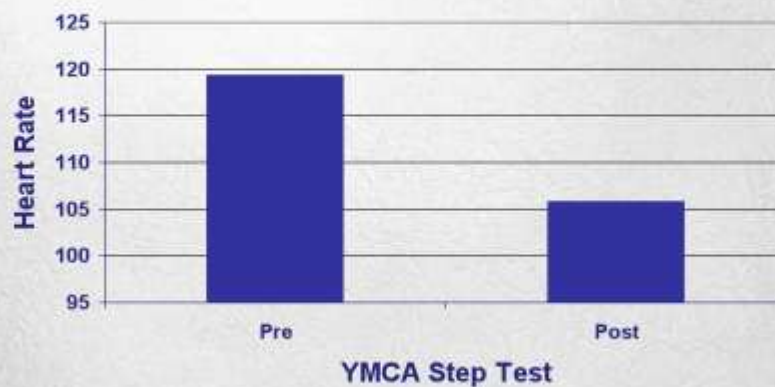
Depression & stress changed from moderate to normal

## Muscular Fitness Results



All patients improved

## Aerobic Fitness Results



## Other Trends

- Reductions in:
  - Diastolic blood pressure
  - Weight
  - Waist circumference
- Increases in:
  - Physical activity levels (42%)
  - Vigorous activity

## **How can my patients benefit?**

- Pick up a package tonight
- Fax back interest form and referrals

Adrienne Forsyth or Alicia Thackray

Phone 4221 5605

Mobile 0406 914 541

adrienne@uow.edu.au

aliciat@uow.edu.au

Fax 4221 5585



**Presentation for Practice Nurses (April 2007)**

**The AIMhi Program:  
Nutrition and Physical Activity  
Counselling for Patients with Mental  
Illness**

**Adrienne Forsyth**

Accredited Practising Dietitian  
Accredited Exercise Physiologist  
PhD Candidate, iiMH



**AIMhi**

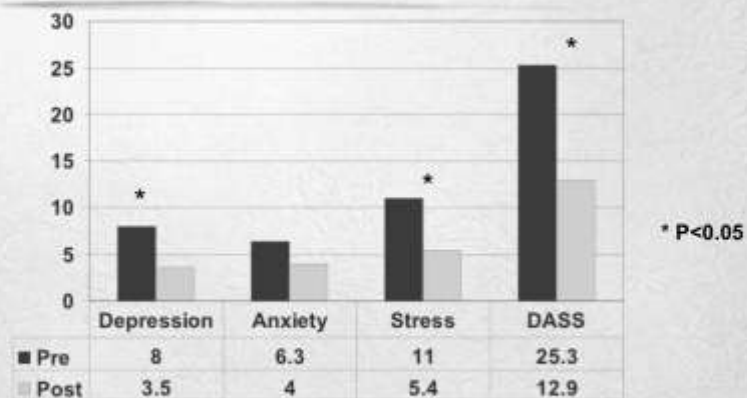
- Adults currently being treated for:
  - Depression
  - Anxiety
- 6 visits to the dietitian / exercise physiologist over 12 weeks
  - 2 assessments
  - 4 consultations



## AIMhi

- FREE to participate
- Does not require a care plan
  - Though can be part of one
- Visits held at UoW or your surgery

## Mental Health Results



**Depression & stress changed from moderate to normal**

## **Other Trends**

- Improvements in:
  - Blood pressure
  - Weight
  - Waist circumference
  - Physical activity levels (42%)
  - Vigorous activity
  - Musculoskeletal fitness
  - Aerobic fitness

## **How can my patients benefit?**

- Pick up a package tonight
- Fax back interest form and referrals
- Janette Ellis can organize referral forms through Profile or Medical Director

Adrienne Forsyth or Alicia Thackray

Phone 4221 5605

Fax 4221 5585

adrienne@uow.edu.au

**APPENDIX B: PATIENT QUESTIONNAIRE PACKAGE**

## The AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Depression and Anxiety

### Questionnaire Package

Please answer all of the enclosed questionnaires to the best of your ability. You will have the opportunity to discuss any of the questions at your next appointment.

Thank You



ID Code:

Date:

**Brief General Health Survey**

Please answer the following questions about yourself and the care you receive from your General Practitioner.

1. **What is the name of your GP?** \_\_\_\_\_  
☐ Regular GP      ☐ Seeing today
2. **Gender:**      ☐ male      ☐ female
3. **Age:**    ☐ under 18    ☐ 19-29      ☐ 30-39      ☐ 40-49      ☐ 50-59  
☐ 60-69      ☐ 70-79      ☐ 80+
4. **Employment Status:**      ☐ employed full-time      ☐ employed part-time  
☐ studying full-time      ☐ studying part-time  
☐ home duties      ☐ unemployed  
☐ pension/benefit      ☐ retired
5. **Do you smoke?**      ☐ yes      ☐ no
6. **Have you ever smoked?**      ☐ yes      ☐ no
7. **Do you drink alcohol?**      ☐ yes      ☐ no
8. **In the last 12 months has your GP talked to you about:**  
Smoking      ☐ yes      ☐ no  
Alcohol & drug      ☐ yes      ☐ no  
Exercise      ☐ yes      ☐ no  
Diet      ☐ yes      ☐ no
9. **In the last 12 months has your GP given you a check-up for:**  
Blood pressure      ☐ yes      ☐ no  
Cholesterol      ☐ yes      ☐ no  
Weight      ☐ yes      ☐ no
10. **Please rate your confidence about being able to talk to your GP about the following, if you needed to.** Please circle the number that best represents your view.

	Not at all Confident				Moderately Confident				Completely Confident		
	0	1	2	3	4	5	6	7	8	9	10
Risk of heart disease	0	1	2	3	4	5	6	7	8	9	10
Risk of diabetes	0	1	2	3	4	5	6	7	8	9	10
Smoking	0	1	2	3	4	5	6	7	8	9	10
Alcohol use	0	1	2	3	4	5	6	7	8	9	10
Diet	0	1	2	3	4	5	6	7	8	9	10
Exercise and active leisure	0	1	2	3	4	5	6	7	8	9	10
Any emotional or mental health problem	0	1	2	3	4	5	6	7	8	9	10
11. **Have you ever been treated for any kind of mental health problem, psychological or psychiatric disorder, 'nerves' or 'nervous breakdown'?**  
☐ yes      ☐ no (if no, skip ahead to question 16)
12. **Do you remember what they said the problem was?** (You may tick more than one box).  
☐ depression      ☐ anxiety      ☐ schizophrenia      ☐ bipolar disorder
13. **When did the problem first start?**  
How many years or months ago? \_\_\_\_\_

ID Code:

Date:

14. When was the most recent time you had these problems?  
☐ within the last 12 months      ☐ \_\_\_\_\_ years ago
15. Has your GP spoken with you, during the last 12 months, about things you can do to prevent the problem coming back, or getting worse?  
☐ yes      ☐ no      ☐ GP not aware of my problem
16. During the past 30 days, about how often did you.....

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
..feel depressed					
..feel so depressed that nothing could cheer you up?					
..feel helpless?					
..feel restless or fidgety?					
..feel so restless that you could not sit still?					
..feel tired out for no good reason?					
..feel that everything was an effort?					
..feel worthless?					
..feel nervous?					
..feel so nervous that nothing could calm you down?					

### Confidence to Manage Health Behaviours

How confident are you that you can do the following? Please rate your confidence using the following scale:

0      10      20      30      40      50      60      70      80      90      100  
 Not at all confident      Moderately confident      Extremely confident

Remember, please put a number next to every item.

1. I can stay off cigarettes for:

At least a week \_\_\_\_\_  
 At least a month \_\_\_\_\_  
 At least 3 months \_\_\_\_\_  
 At least 6 months \_\_\_\_\_  
 All the time \_\_\_\_\_

2. I can have no more than 4 alcoholic drinks per day (men), or 2 alcoholic drinks per day (women) for:

At least a week \_\_\_\_\_  
 At least a month \_\_\_\_\_  
 At least 3 months \_\_\_\_\_  
 At least 6 months \_\_\_\_\_  
 All the time \_\_\_\_\_

3. I can do some moderate physical activity, at least 3-4 times per week for:

At least a week \_\_\_\_\_  
 At least a month \_\_\_\_\_  
 At least 3 months \_\_\_\_\_  
 At least 6 months \_\_\_\_\_  
 All the time \_\_\_\_\_

4. I can eat at least 2 serves of fruit and 2 serves of vegetables per day for:

At least a week \_\_\_\_\_  
 At least a month \_\_\_\_\_  
 At least 3 months \_\_\_\_\_  
 At least 6 months \_\_\_\_\_  
 All the time \_\_\_\_\_

5. I can brush my teeth at least once a day for:

At least a week \_\_\_\_\_  
 At least a month \_\_\_\_\_  
 At least 3 months \_\_\_\_\_  
 At least 6 months \_\_\_\_\_  
 All the time \_\_\_\_\_

ID Code:

Date:

**Audit and Severity of Dependence Scale**

1. How often do you have a drink containing alcohol?

- ☐ Never      ☐ monthly or less      ☐ once a week      ☐ 2 to 4 times a week      ☐ 5 or more times a week

2. How many 'standard drinks' do you have on a typical day when you are drinking?

NOTE: 1 standard drink equals a middy of beer, a small glass of wine, a small glass of sherry or port, or a nip of spirits

- ☐ 1    ☐ 2    ☐ 3    ☐ 4    ☐ 5    ☐ 6    ☐ 7    ☐ 8    ☐ 9    ☐ 10    ☐ other:

3. How often do you have six or more drinks on one occasion?

- ☐ never      ☐ less than monthly      ☐ monthly      ☐ weekly      ☐ daily or almost daily

4. How often during the last 3 months have you found that you were not able to stop drinking once you had started?

- ☐ never      ☐ less than monthly      ☐ monthly      ☐ weekly      ☐ daily or almost daily

5. How often during the last 3 months have you failed to do what was normally expected of you because of your drinking?

- ☐ never      ☐ less than monthly      ☐ monthly      ☐ weekly      ☐ daily or almost daily

6. How often during the last 3 months have you needed an alcoholic drink in the morning to get yourself going after a heavy drinking session?

- ☐ never      ☐ less than monthly      ☐ monthly      ☐ weekly      ☐ daily or almost daily

7. How often during the last 3 months have you had a feeling of guilt or remorse after drinking?

- ☐ never      ☐ less than monthly      ☐ monthly      ☐ weekly      ☐ daily or almost daily

8. How often during the last 3 months have you been unable to remember what happened the night before because you had been drinking?

- ☐ never      ☐ less than monthly      ☐ monthly      ☐ weekly      ☐ daily or almost daily

9. Have you or someone else been injured because of your drinking?

- ☐ no      ☐ yes, but not in the last 3 months      ☐ yes, during the last 3 months

10. Has a relative or friend, or a doctor or other health worker been concerned about your drinking or suggested you cut down?

- ☐ no      ☐ yes, but not in the last 3 months      ☐ yes, during the last 3 months

Please consider your most commonly used substance when answering the following questions:

During the past 3 months:

1. Did you ever think your use of (*substance*) was out of control?

- ☐ never/almost never      ☐ sometimes      ☐ often      ☐ always/nearly always

2. Did the prospect of missing a fix (or dose) or not chasing, make you anxious or worried?

- ☐ never/almost never      ☐ sometimes      ☐ often      ☐ always/nearly always

3. Did you worry about you use of (*substance*)?

- ☐ never/almost never      ☐ sometimes      ☐ often      ☐ always/nearly always

4. Did you wish you could stop?

- ☐ never/almost never      ☐ sometimes      ☐ often      ☐ always/nearly always

5. How difficult did you find it to stop, or go without (*substance*)?

- ☐ not difficult      ☐ quite difficult      ☐ very difficult      ☐ impossible

ID Code:

DASS-21

Date:

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g. in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

ID Code:

**RAS**

Date:

Instructions: Below is a list of statements that describe how people sometimes feel about themselves and their lives. Please read each one carefully and circle the number that best describes the extent to which you agree or disagree with the statement. Circle only one number for each statement and do not skip any items.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Not Sure</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>1.</b>	I have a desire to succeed	0	1	2	3	4
<b>2.</b>	I have my own plan for how to stay or become well.	0	1	2	3	4
<b>3.</b>	I have goals in life that I want to reach.	0	1	2	3	4
<b>4.</b>	I believe I can meet my current personal goals.	0	1	2	3	4
<b>5.</b>	I have a purpose in life.	0	1	2	3	4
<b>6.</b>	Even when I don't care about myself, other people do.	0	1	2	3	4
<b>7.</b>	I understand how to control the symptoms of my mental illness.	0	1	2	3	4
<b>8.</b>	I can handle it if I get sick again.	0	1	2	3	4
<b>9.</b>	I can identify what triggers the symptoms of my mental illness.	0	1	2	3	4
<b>10</b>	I can help myself become better.	0	1	2	3	4
<b>11</b>	Fear doesn't stop me from living the way I want to.	0	1	2	3	4
<b>12</b>	I know that there are mental health services that do help me.	0	1	2	3	4
<b>13</b>	There are things that I can do that help me deal with unwanted symptoms.	0	1	2	3	4
<b>14</b>	I can handle what happens in my life.	0	1	2	3	4
<b>15</b>	I like myself.	0	1	2	3	4
<b>16</b>	If people really knew me, they would like me.	0	1	2	3	4
<b>17</b>	I am a better person than before my experience with mental illness.	0	1	2	3	4
<b>18</b>	Although my symptoms may get worse, I know I can handle it.	0	1	2	3	4
<b>19</b>	If I keep trying, I will continue to get better.	0	1	2	3	4
<b>20</b>	I have an idea of who I want to become.	0	1	2	3	4
<b>21</b>	Things happen for a reason.	0	1	2	3	4
<b>22</b>	Something good will eventually happen.	0	1	2	3	4
<b>23</b>	I am the person most responsible for my own improvement.	0	1	2	3	4
<b>24</b>	I'm hopeful about my future.	0	1	2	3	4



ID Code:

Date:

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Not Sure</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>25</b>	I continue to have new interests.	0	1	2	3	4
<b>26</b>	It is important to have fun.	0	1	2	3	4
<b>27</b>	Coping with my mental illness is no longer the main focus of my life.	0	1	2	3	4
<b>28</b>	My symptoms interfere less and less with my life.	0	1	2	3	4
<b>29</b>	My symptoms seem to be a problem for shorter periods of time each time they occur.	0	1	2	3	4
<b>30</b>	I know when to ask for help.	0	1	2	3	4
<b>31</b>	I am willing to ask for help.	0	1	2	3	4
<b>32</b>	I ask for help, when I need it.	0	1	2	3	4
<b>33</b>	Being able to work is important to me.	0	1	2	3	4
<b>34</b>	I know what helps me get better.	0	1	2	3	4
<b>35</b>	I can learn from my mistakes.	0	1	2	3	4
<b>36</b>	I can handle stress.	0	1	2	3	4
<b>37</b>	I have people I can count on.	0	1	2	3	4
<b>38</b>	I can identify the early warning signs of becoming sick.	0	1	2	3	4
<b>39</b>	Even when I don't believe in myself, other people do.	0	1	2	3	4
<b>40</b>	It is important to have a variety of friends.	0	1	2	3	4
<b>41</b>	It is important to have healthy habits.	0	1	2	3	4

ID Code:

**Physical Activity**

Date:

The following questions are to find out about the **different types** of physical activity you did over the **PAST WEEK**.

**It is important that you answer all parts of this question.**

**1. In the past week, how many times have you WALKED for recreation or exercise and/or to do errands for at least 10 minutes continuously?**

\_\_\_\_\_ times

Please estimate the **total** time you spent walking in the past week

\_\_\_\_\_ hours / \_\_\_\_\_ minutes

**2. In the past week, how many times did you do VIGOROUS exercise or other physical activity (in your leisure-time or at work) which made you breathe harder or puff or pant?**

(e.g. jogging or running, heavy gardening, netball, chopping wood, vigorous swimming, heavy laboring, etc.)

\_\_\_\_\_ times

Please estimate the **total time** you spent doing vigorous exercise or physical activity in the past week.

\_\_\_\_\_ hours / \_\_\_\_\_ minutes

**3. In the past week, how many times did you do MODERATE exercise or other physical activity (in your leisure-time or at work) which DID NOT make you breathe harder or puff and pant?**

(e.g. more moderate activities – digging in the garden, moderate cycling, raking leaves, dancing, etc)

\_\_\_\_\_ times

Please estimate the **total** time you spent doing moderate exercise or physical activity in the past week.

\_\_\_\_\_ hours / \_\_\_\_\_ minutes

ID Code:

Date:

The next question is about your **leisure time** – that time when you are **NOT** working, travelling to work, or sleeping.

**1.** Please estimate the **total time** from Monday to Friday, then for Saturday & Sunday you spent in **SEDENTARY RECREATION** (i.e. seated or less mobile activities) **during the PAST WEEK**.

**PLEASE NOTE: If you spent zero time in any activity mentioned below please put "0".**

**An example:**

If you spent a total of 5 hours Monday to Friday, and 2 hours Saturday & Sunday doing your hobbies, your answer would look like this:

	Total hours/mins Monday to Friday	Total hours/mins Saturday & Sunday
Hobbies (e.g. arts/crafts, work on car, play musical instruments)	5	2

Activity	Total hours/mins Monday to Friday	Total hours/mins Saturday & Sunday
<b>Hobbies</b> (e.g. arts/crafts, work on car, play musical instruments)		
<b>Reading</b> (books, papers, magazines)		
<b>Sitting and socializing</b> with friends and family (at home, pubs, restaurants)		
<b>Sitting or lying and listening</b> to music/radio		
<b>Talking on the telephone</b>		
<b>Watching TV / videos</b> (including video games)		
<b>Using the computer</b> (including games)		
<b>Going for a drive</b>		
<b>Relaxing, thinking, resting</b> (NOT including sleeping)		
<b>Other inactive recreation</b> (specify):		

ID Code:

Date:

**Brief Diet Survey**

1. **What type of milk do you usually consume?** *Choose one type of milk only*
- ☐ Whole (full cream)
  - ☐ Low or reduced fat
  - ☐ Skim
  - ☐ Soy milk
  - ☐ Evaporated or sweetened condensed
  - ☐ None of the above / don't drink milk
  - ☐ Don't know
2. **How often is the meat you eat trimmed of fat?**
- ☐ Never / rarely
  - ☐ Sometimes
  - ☐ Usually
  - ☐ Don't eat meat
3. **How many serves of vegetables do you usually eat each day?** *Include fresh, frozen or tinned vegetables (a 'serve' = ½ cup cooked vegetables or 1 cup of salad vegetables)*
- ☐ 1 serve or less
  - ☐ 2 to 3 serves
  - ☐ 4 to 5 serves
  - ☐ 6 serves or more
  - ☐ Don't eat vegetables
4. **How many serves of fruit do you usually eat each day?** *Include fresh, frozen or tinned fruit (a 'serve' = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces)*
- ☐ 1 serve or less
  - ☐ 2 to 3 serves
  - ☐ 4 to 5 serves
  - ☐ 6 serves or more
  - ☐ Don't eat fruit
5. **How many days a week do you eat take-away or 'fast foods' (such as fish and chips, hamburgers, fried chicken, pizza, sausage rolls, meat pies)?**
- ☐ 6 or more
  - ☐ 3 to 5
  - ☐ 1 to 2
  - ☐ Less than once a week
  - ☐ Never
6. **Did you take any vitamin or mineral supplement yesterday?** *(in tablet, capsule or drop form)*
- ☐ Yes
  - ☐ No
- If yes please either:**  
**List the TGA code number** \_\_\_\_\_  
**OR**  
**Tick the type of supplement below:**
- ☐ Multivitamin
  - ☐ Multivitamin with iron
  - ☐ Vitamin A
  - ☐ Vitamin B
  - ☐ Vitamin C
  - ☐ Vitamin E
  - ☐ Beta Carotene
  - ☐ Calcium
  - ☐ Folic acid / Folate
  - ☐ Iron
  - ☐ Zinc
  - ☐ Don't take supplements
  - ☐ Other (Product name if known) \_\_\_\_\_
7. **When cooking, how often do you or the person who cooks your food use the following?** *Choose any of the following which apply to you:*
- |                         |       |           |         |            |
|-------------------------|-------|-----------|---------|------------|
| <b>Olive oil</b>        | Never | Sometimes | Usually | Don't know |
| <b>Canola oil</b>       | Never | Sometimes | Usually | Don't know |
| <b>Vegetable oil</b>    | Never | Sometimes | Usually | Don't know |
| <b>Butter</b>           | Never | Sometimes | Usually | Don't know |
| <b>Margarine</b>        | Never | Sometimes | Usually | Don't know |
| <b>Dairy blend</b>      | Never | Sometimes | Usually | Don't know |
| <b>Lard or dripping</b> | Never | Sometimes | Usually | Don't know |

## APPENDIX C: DATA COLLECTION FORMS

### AIMhi Assessment Form

**Patient Code:** \_\_\_\_\_ **Sex:** M F **Birthdate:** \_\_\_\_\_ **Referring GP:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Date:** \_\_\_\_\_

☐ Informed consent completed

☐ Surveys completed

☐ Diet history completed

☐ Medical history completed

☐ Surveys completed

☐ Diet history completed

☐ Surveys completed

☐ Diet history completed

**Blood Pressure:** \_\_\_\_\_

**Blood Pressure:** \_\_\_\_\_

**Blood Pressure:** \_\_\_\_\_

**Weight (kg):** \_\_\_\_\_

**Weight (kg):** \_\_\_\_\_

**Weight (kg):** \_\_\_\_\_

**Height (cm):** \_\_\_\_\_

**Height (cm):** \_\_\_\_\_

**Height (cm):** \_\_\_\_\_

**Waist (cm):** \_\_\_\_\_

**Waist (cm):** \_\_\_\_\_

**Waist (cm):** \_\_\_\_\_

#### YMCA 3-minute Step Test

#### YMCA3-minute Step Test

#### YMCA 3-minute Step Test

Adjustments: \_\_\_\_\_

Adjustments: \_\_\_\_\_

Adjustments: \_\_\_\_\_

Resting HR (BPM): \_\_\_\_\_

Resting HR (BPM): \_\_\_\_\_

Resting HR (BPM): \_\_\_\_\_

Post test HR (BPM, 15x4): \_\_\_\_\_

Post test HR (BPM): \_\_\_\_\_

Post test HR (BPM): \_\_\_\_\_

**30s Chair stand test (reps):** \_\_\_\_\_

**30s Chair stand test (reps):** \_\_\_\_\_

**30s Chair stand test (reps):** \_\_\_\_\_

**30s Arm curl test (reps):** \_\_\_\_\_

**30s Arm curl test (reps):** \_\_\_\_\_

**30s Arm curl test (reps):** \_\_\_\_\_

Total Time: \_\_\_\_\_

Total Time: \_\_\_\_\_

Total Time: \_\_\_\_\_

DEP Signature: \_\_\_\_\_

DEP Signature: \_\_\_\_\_

DEP Signature: \_\_\_\_\_

**Medical History (incl. physical and mental health, surgeries, blood test results – BGLs, cholesterol, blood pressure)(include approx. dates)**

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**Medications**

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**Current Treatment or Therapy**

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**Weight History**

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**Physical Activity History**

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**APPENDIX D: DIET HISTORY INTERVIEW**

Code:  
Date:  
Site:

**diet history  
questionnaire**

---

Return to:  
Smart Foods Centre  
University of Wollongong  
Northfields Av, Wollongong NSW 2522. Australia  
Phone: +61 2 42214232  
Fax: +61 2 42214844



Interviewer: \_\_\_\_\_

DOB: \_\_\_\_\_ Age: \_\_\_\_\_

Ht: \_\_\_\_\_ cm Weight: \_\_\_\_\_

BMI: \_\_\_\_\_ BMR: \_\_\_\_\_

Medications: \_\_\_\_\_

History of health conditions: \_\_\_\_\_

Supplements: \_\_\_\_\_

Physical activity level: \_\_\_\_\_

**Core Food Choices:** Please indicate the ***type*** of foods you select in these categories

Food group	Type	Food group	Type
Milk (full fat, skim)		Spread (margarine etc)	
		Oils (olive, canola)	
Bread (white, grain)			
		Drinks (sweetening)	





### Part 2: Light Meal.

**Lunch or Dinner** (Circle)

How often do you eat this meal?

[Home](#)

### Away

**Sandwiches/Rolls**[illegible]

## Salads

Description (include all components)	Amount	Frequency
Dressings		

## Soups

Description (include all components)	Amount	Frequency
Soup mix		
Added salt		
Bread		

## Other foods (including drinks, fruit, takeaway meals, cakes)

[illegible]

### Part 3: Main Meal.

**Lunch or Dinner (Circle)**

How often do you eat this meal?

[Home](#)

Away

[illegible]



### Part 5: Food Frequency Checklist

Food category	Amount	Frequency
Bread/crumpet		
Biscuits		
Crispbreads/crackers		
Cakes/scones/muffins/pastries		
Pancakes		
Beans/legumes		
Fruit		
Fruit juice		
Soft drinks/cordials		
Chocolate/lollies		
Chips		
Alcohol		
Milk		
Yoghurt		
Ice cream		
Cheese		
Dip/cream cheese/cheese spread		
Soy milk		
Soy yoghurt		
Eggs/omega eggs		
Salmon/tuna (fresh/canned)		
Sardines/Mackerel		
White fish varieties		
Oysters		
Walnuts		
Pecans		
Other nuts		
Seeds		

## Part 6: Food Preparation Practices

### 6.1 Butter/Margarine

What type do you usually use?

Butter

Dairy blend

Margarine - polyunsaturated, regular

Margarine - polyunsaturated, reduced fat

Margarine - monounsaturated, regular

Other \_\_\_\_\_

### 6.2 Oil/Fat in cooking

What type of oil/fat do you use in cooking?

Butter

Dairy blend

Margarine - polyunsaturated, regular

Margarine - polyunsaturated, reduced fat

Margarine - monounsaturated, regular

Olive oil

Canola oil

Soybean oil

Gold'n Canola

Other \_\_\_\_\_

### 6.3 Fat on Meats/Chicken

How much fat is trimmed from meat before cooking/eating?

a) None

b) 25%

c) 50%

d) 75%

e) All

How much of the skin on chicken to you remove before cooking/eating?

a) None

b) 25%

c) 50%

d) 75%

e) All

Other, please specify: \_\_\_\_\_

## APPENDIX E: PARTICIPANT INFORMATION SHEET

### UNIVERSITY OF WOLLONGONG

#### PARTICIPANT INFORMATION SHEET

#### **Effectiveness of tailored nutrition and physical activity interventions by a dietitian and exercise physiologist on the mental health outcomes of patients with depression and/or anxiety in primary care**

This sheet provides information about *Effectiveness of tailored nutrition and physical activity interventions by a dietitian and exercise physiologist on the mental health outcomes of patients with depression and/or anxiety in primary care*. Adrienne Forsyth is conducting this research as part of a PhD supervised by Assoc. Prof. Peter Williams and Prof. Frank Deane in the School of Health Science and Psychology at the University of Wollongong. The research also involves other researchers at the Illawarra Institute for Mental Health at the University of Wollongong. Funding for this research is provided by the National Health and Medical Research Council.

#### **Background:**

Research has shown that increased physical activity and improved diet can help improve mental health. These benefits have been seen in experimental trials, but they have not been studied in patients visiting a dietitian and exercise physiologist at their doctor's surgery. The aim of this project is to evaluate the effectiveness of providing individualized nutrition and physical activity interventions by a dietitian and exercise physiologist for patients with depression and/or anxiety.

#### **Details of the study:**

This nutrition and physical activity services provided in this study are free. There will be no cost for you to participate in this study at any time.

You will be asked to complete an assessment of your mental and physical health with the dietitian and exercise physiologist. This will involve completing several questionnaires, answering questions about your eating habits, taking measurements including your waist circumference, weight and height, blood pressure, and completing simple exercise tests. The exercise tests will require you to step for three minutes, and to do simple leg and arm exercises including standing up out of a chair and performing arm curls with a small hand weight. You will be asked to provide a summary of your current health issues. Your doctor will not be asked to provide this information. In total, this assessment should take about 90 minutes.

You will then be selected to attend a series of individual consultations with the dietitian and exercise physiologist either immediately, or after a 3-month waiting period. If you are selected to wait, you will receive fortnightly phone calls from the dietitian and exercise physiologist until you commence the individual consultations.

At the individual consultations, you will discuss your current eating and physical activity habits with the dietitian and exercise physiologist. You will work together to improve your eating habits and increase your physical activity based on your personal goals and the results of your physical health assessment. You will be asked to attend four consultations over 12 weeks. The individual consultations will take 30 to 60 minutes.

You will be asked to return for a follow-up assessment one week after you have completed your series of individual consultations with the dietitian and exercise physiologist. A follow-up assessment will be offered three to six months after completing the program.

**Important information:**

It is likely that you will increase your participation in physical activity as a result of participation in this research. Physical activity, when performed incorrectly or in excessive amounts, can cause injury. This risk will be minimized with clear instructions from the dietitian and exercise physiologist regarding the best type, amount and intensity of physical activity for you to participate in based on your goals and the results of your physical health assessment.

Although this research is being conducted with a referral from your doctor, it will in no way affect your treatment from your doctor. Adrienne Forsyth and the University of Wollongong are not affiliated with your doctor's surgery, and will be present only to conduct research. You are free to refuse to participate, or to withdraw your consent at any time. Refusal to participate in this study will not affect your treatment from your doctor or your relationship with the University of Wollongong.

All personal information collected during the course of this research will be stored in locked files at the University of Wollongong, and will be identified only by a code number. You will not be identifiable in any publications that come from this research. With your consent, your health information collected in the interview with the dietitian and exercise physiologist will be provided to your doctor to assist in your medical care. Your personal information will not be made available to anyone else, for any reason. It is not our intention to report any disclosed drug use, but this information could be revealed in the rare chance that it is required by a court of law.

If you have any questions or concerns about your participation in this research, please do not hesitate to contact Adrienne Forsyth on 4221 5605 or Assoc. Prof. Peter Williams on 4221 4085. If you have any concerns or complaints regarding the way in which the research is or has been conducted, you should contact the Secretary of the University of Wollongong Human Research Ethics Committee on (02) 4221 4457.



## APPENDIX F: CONSENT FORM

### UNIVERSITY OF WOLLONGONG

#### CONSENT FORM

#### **Effectiveness of tailored nutrition and physical activity interventions by a dietitian and exercise physiologist on the mental health outcomes of patients with depression and/or anxiety in primary care**

**Adrienne Forsyth**

I have been given information about *Effectiveness of tailored nutrition and physical activity interventions by a dietitian and exercise physiologist on the mental health outcomes of patients with depression and/or anxiety in primary care* and discussed the research project with Adrienne Forsyth who is conducting this research as part of a PhD supervised by Assoc. Prof. Peter Williams and Prof. Frank Deane in the School of Health Science and Psychology at the University of Wollongong.

I understand that, if I consent to participate in this project I will be asked to

- complete assessments of my mental and physical health, including performing simple exercises,
- and attend individual consultations with the dietitian and exercise physiologist.

I consent for Adrienne Forsyth to share the information about my health that she collects with my doctor.

I have been advised of the potential risks and burdens associated with this research, which could include injury due to exercise, and have had an opportunity to ask Adrienne Forsyth any questions I may have about the research and my participation.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect the treatment provided by my doctor in any way.

If I have any enquiries about the research, I understand I can contact Adrienne Forsyth on 4221 5605 and Dr. Peter Williams on 4221 4085 or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, Research Services Office, University of Wollongong on 4221 4457.

By signing below I am indicating my consent to participate in the research entitled *Effectiveness of tailored nutrition and physical activity interventions by a dietitian and exercise physiologist on the mental health outcomes of patients with depression and/or*

*anxiety in primary care*, conducted by Adrienne Forsyth as it has been described to me in the information sheet and in discussion with Adrienne. I understand that the data collected from my participation will be used for analysis in a doctoral thesis and journal publications, and I consent for it to be used in that manner.

Please tick below if you agree:

☐ I consent for Adrienne Forsyth to share the information about my health that she collects with my doctor.

SignedName (please print)Date

...../...../.....

## APPENDIX G: CONSULTATION FORMS

### Initial Consultation Form

Patient code: \_\_\_\_\_ Date: \_\_\_\_\_

Changes in physical and mental health since last visit:

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Changes in therapy and treatment including medications since last visit:

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Occupation/Role/Daily Activities:

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Food Shopping/Preparation/Cooking Responsibilities:

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Significant Stressors:

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Factors influencing nutrition and physical activity:

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Long-term personal goals:

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Long-term nutrition and physical activity goals (or physical changes to help achieve personal goals):

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---

Short-term (3-month) nutrition and physical activity goals and plan:

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Dietitian/Exercise Physiologist Signature: \_\_\_\_\_

Review Consultation Form

Review #: \_\_\_\_\_

Patient code: \_\_\_\_\_ Date: \_\_\_\_\_

Changes in physical and mental health since last visit:

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---

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Changes in therapy and treatment including medications since last visit:

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Changes in occupation/role/daily activities since last visit:

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Changes to nutrition and physical activity since last visit:

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Feedback on current program / progress:

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Revised goals and plan:

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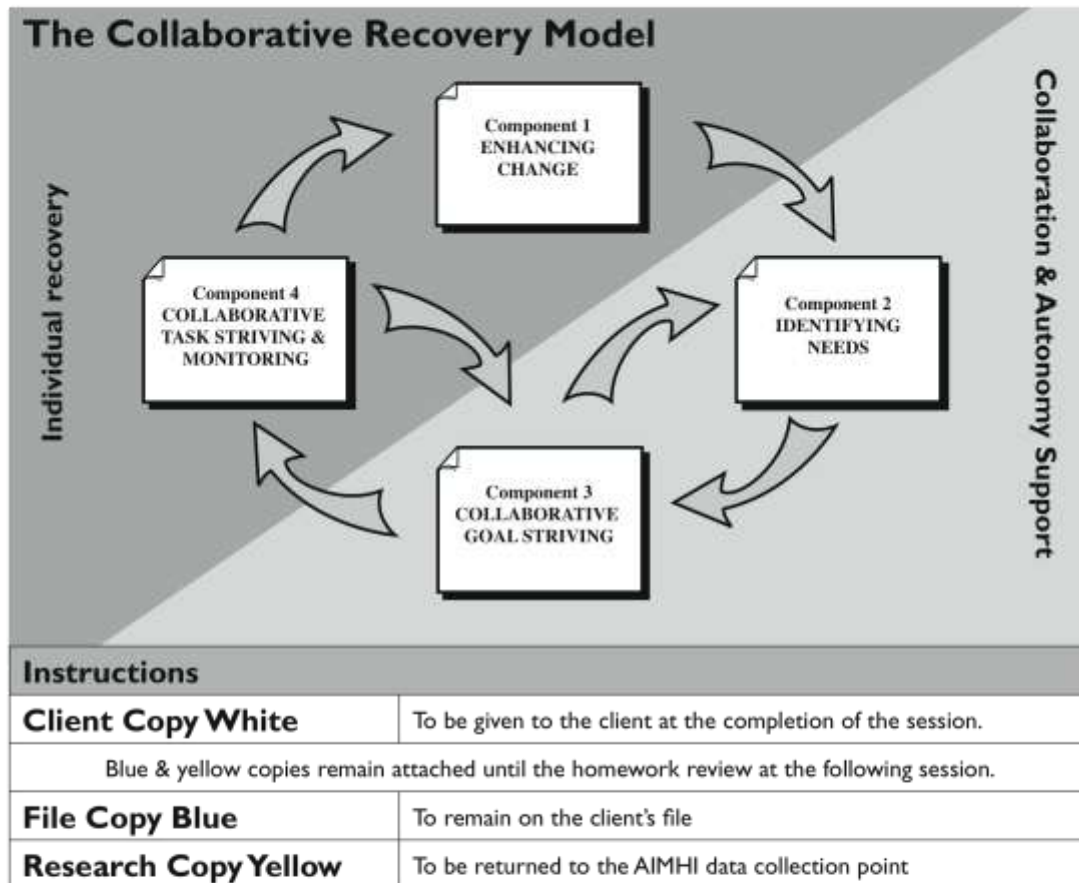
---

Dietitian/Exercise Physiologist Signature: \_\_\_\_\_

## APPENDIX H: HOMEWORK SHEET



# Homework Assignment Pad



### To order additional homework assignment pads contact:

Administrative Assistant  
 Illawarra Institute for Mental Health  
 University of Wollongong  
 Wollongong NSW, Australia 2522  
 Phone: 02 4221 4207  
 Fax: 02 4221 5585

University of Wollongong



Homework Assignment	
<b>Definition</b>	<ul style="list-style-type: none"> <li>Homework refers to any therapeutic activity that a client may complete outside of treatment.</li> <li>It should be purposeful and related to therapeutic goals.</li> <li>Homework provides an opportunity for clients to transfer skills developed in treatment to other environments.</li> </ul>
<b>Systematic</b>	<ul style="list-style-type: none"> <li>Evidence suggests that homework is most effective when it is used systematically.</li> <li>Clinicians should monitor homework and provide clients with a clear rationale of the homework's purpose.</li> <li>Clinicians maximise homework adherence by providing written details of the location, time, duration and frequency that homework should be completed.</li> </ul>
<b>Collaborative</b>	<ul style="list-style-type: none"> <li>Homework should be developed collaboratively with the client and clearly linked to their goals.</li> <li>Discuss with the client their preferences regarding types of homework.</li> </ul>
<b>Confidence</b>	<ul style="list-style-type: none"> <li>Ask the client how confident they are in completing the assigned task.</li> <li>If the confidence rating is less than 70% collaboratively modify or adjust the homework.</li> </ul>

### Sample Homework

File Copy to be stored permanently in the client's file

If assigning more than one homework task use additional homework sheets

Specify the client's goal (identified on the Collaborative Goal Technology) that is linked to the homework task

Clarify the day, date and time of day that the homework should be completed

Be specific with the exact location(s) where the homework should be completed

The client should rate this scale at the beginning of the next session.

The clinician should rate this scale following the session.

**File Copy\***

**iiMH**  
ILLAWARRA INSTITUTE FOR MENTAL HEALTH

**Date:** 7/7/03  
**Client Name:** Lloyd Dobler  
**Client ID No.:** 1407  
**Clinician Name:** Lane Meyer  
**Service:** Aftercare

**HW Assignment # One**

**Homework Description:**  
To catch a bus into the shopping centre

**Relevant Goal**  
To do my own shopping

**How often**  
Once a week over the next 2 weeks

**When**  
Wednesday 24<sup>th</sup> at 9.30am  
Wednesday 31<sup>st</sup> at 9.30am

**For how long**  
15 minute bus trip

**Where**  
Bus stop in front of my house to the shopping centre

**Confidence Rating (circle one)**  
0 10 20 30 40 50 60 70 **(80)** 90 100

Rating scales should be completed at the following session and refer to the above homework.

**Client Rating of Homework Performance**

1. How much homework did you do since the last session?	0	1	<b>(2)</b>	3	4
2. How well did you do the homework?	0	1	2	<b>(3)</b>	4
3. How difficult was the homework?	0	1	2	<b>(3)</b>	4

**Clinician use only**

**Date of review** 14/7/03

How much? 3    How well? 4    How difficult? 3

Clearly print demographics

Provide a detailed description of exactly what the homework task entails

Clearly specify the frequency with which each task should be completed

Specify the length of time that the homework task should be conducted

If the client's confidence rating is less than 70% collaboratively modify or adjust the homework.

Client evaluates **their own** homework performance & should not be influenced by the clinician.

Rating of the **clinician's perception** of the homework performance.

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Keep File & Research copies attached until homework ratings have been completed at the next session.

# File Copy \*



Homework Assignment # \_\_\_\_\_

Date Assigned: \_\_\_\_\_  
 Client Name: \_\_\_\_\_  
 Client ID No.: \_\_\_\_\_  
 Clinician Name: \_\_\_\_\_  
 Service: \_\_\_\_\_

<b>Homework Description:</b>																						
<b>Relevant Goal</b> (see Collaborative Goal worksheet):																						
<b>How often</b> (e.g., times per day/hour/week):																						
<b>When</b> (e.g., 11:45 am before lunch):																						
<b>For how long</b> (e.g., hours/minutes):																						
<b>Where</b> (e.g., in the bedroom / at work):																						
<p><b>Confidence Rating</b> (circle one):</p> <table style="margin: auto; border: none;"> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">10</td> <td style="text-align: center;">20</td> <td style="text-align: center;">30</td> <td style="text-align: center;">40</td> <td style="text-align: center;">50</td> <td style="text-align: center;">60</td> <td style="text-align: center;">70</td> <td style="text-align: center;">80</td> <td style="text-align: center;">90</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center; font-size: small;">Not at all confident</td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center; font-size: small;">Moderately confident</td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center; font-size: small;">Totally confident</td> </tr> </table>	0	10	20	30	40	50	60	70	80	90	100	Not at all confident					Moderately confident					Totally confident
0	10	20	30	40	50	60	70	80	90	100												
Not at all confident					Moderately confident					Totally confident												

Rating scales should be completed at the following session and refer to the above homework

<b>Client Rating of Homework Performance *</b>					
<b>Instructions:</b> Circle the number of the scale that best describes how well you think you were able to complete the homework assignment. Please answer all three questions.					
1. How <u>much</u> homework did you do since the last session?	0 none	1 a little	2 some	3 a lot	4 all
2. How <u>well</u> did you do the homework?	0 not at all	1 somewhat	2 moderately	3 very	4 extremely
3. How <u>difficult</u> was the homework?	0 not at all	1 somewhat	2 moderately	3 very	4 extremely
<b>Clinician use only.</b> To be completed at the completion of the session.					
1. How much? _____			2. How well? _____		3. How difficult? _____
Date of Review ____/____/____					

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**Keep File & Research copies attached until homework ratings have been completed at the next session.**



# Research Copy \*



Date Assigned: \_\_\_\_\_  
 Client Name: \_\_\_\_\_  
 Client ID No.: \_\_\_\_\_  
 Clinician Name: \_\_\_\_\_  
 Service: \_\_\_\_\_

Homework Assignment # \_\_\_\_\_

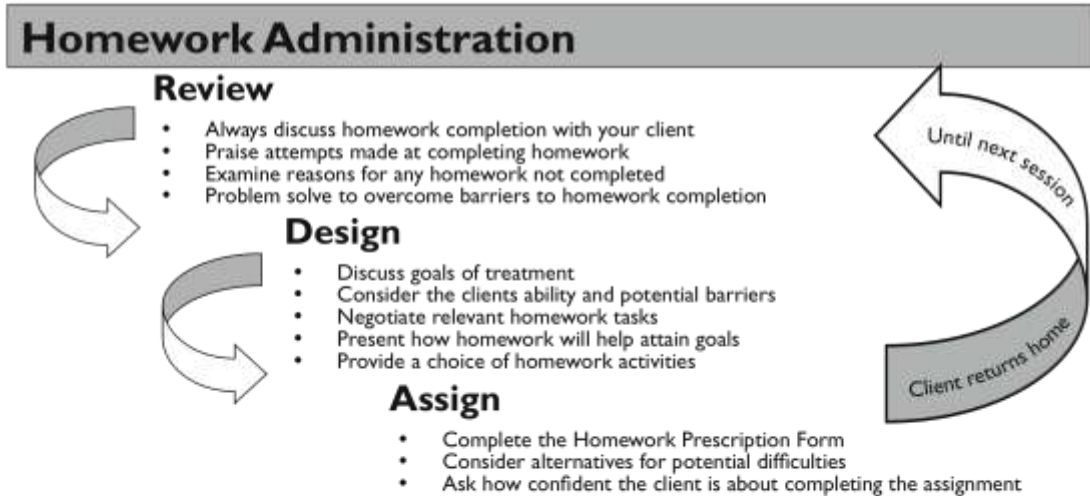
<b>Homework Description:</b>
<b>Relevant Goal</b> (see Collaborative Goal worksheet)
<b>How often</b> (e.g., times per day/hour/week):
<b>When</b> (e.g., 11:45 am before lunch)
<b>For how long</b> (e.g., hours/minutes):
<b>Where</b> (e.g., in the bedroom / at work):
<p align="center"><b>Confidence Rating</b> (circle one):</p> <p align="center">             0      10      20      30      40      50      60      70      80      90      100  <small>Not at all confident      Moderately confident      Totally confident</small> </p>

<b>Client Rating of Homework Performance *</b>					
<b>Instructions:</b> Circle the number of the scale that best describes how well you think you were able to complete the homework assignment. Please answer all three questions.					
1. How <u>much</u> homework did you do since the last session?	0 none	1 a little	2 some	3 a lot	4 all
2. How <u>well</u> did you do the homework?	0 not at all	1 somewhat	2 moderately	3 very	4 extremely
3. How <u>difficult</u> was the homework?	0 not at all	1 somewhat	2 moderately	3 very	4 extremely
<p><b>Clinician use only.</b> To be completed at the completion of the session.      Date of Review ____/____/____</p> <p>1. How much? _____      2. How well? _____      3. How difficult? _____</p>					

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**Please Return to Your AIMHI Data Collection Point**

Strategies to increase homework adherence	
<b>Collaborative</b>	<ul style="list-style-type: none"> <li>• Ask the client to provide suggestions about possible tasks that might help them move towards their goals.</li> <li>• Provide clients with a choice of activities or options of ways to complete the homework.</li> <li>• The more involved that the client is in the development of the task the more likely they will attempt the homework.</li> </ul>
<b>Meaningful</b>	<ul style="list-style-type: none"> <li>• Ensure that the homework is central to the goals of treatment and that the client understands and agrees with the rationale for using the task.</li> <li>• Try asking the client if they understand why the homework task might be helpful and whether they view the homework as relevant.</li> </ul>
<b>Begin Small</b>	<ul style="list-style-type: none"> <li>• Start with behaviours that the client already completes 30% of the time.</li> <li>• Break complex or difficult behaviours into smaller parts</li> <li>• As the client becomes more confident, increase the difficulty of the tasks being assigned.</li> <li>• Homework that is too difficult it is unlikely to be completed.</li> </ul>
<b>Practice</b>	<ul style="list-style-type: none"> <li>• Practice skills required to perform the homework within the session.</li> <li>• Practice will ensure the homework is being conducted appropriately and increases the clients confidence.</li> </ul>
<b>Alliance</b>	<ul style="list-style-type: none"> <li>• Reinforce all pro-homework behaviour.</li> <li>• Provide praise and encouragement for attempts as well as success with homework.</li> </ul>
<b>Barriers</b>	<ul style="list-style-type: none"> <li>• Collaboratively brainstorm potential barriers to the completion of the homework tasks.</li> <li>• Consider alternative activities for potential difficulties to homework completion (e.g. Bad weather preventing outdoor activities).</li> </ul>



Overcoming Potential obstacles	
<b>Lack of motivation</b>	<ul style="list-style-type: none"> <li>• Consider developing motivation as a treatment goal</li> <li>• Implement a motivational interviewing approach</li> <li>• Ensure that the homework tasks are relevant to the clients goals</li> </ul>
<b>Distractibility</b>	<ul style="list-style-type: none"> <li>• Reduce the complexity and duration of the tasks</li> <li>• Use environmental cues where possible</li> <li>• Provide clear written instructions that are simple &amp; easy to understand</li> </ul>
<b>Difficulty Starting</b>	<ul style="list-style-type: none"> <li>• Provide clear prompts, use a family member to encourage homework participation</li> <li>• Begin with small tasks and gradually increase the complexity of the homework.</li> <li>• Provide continual reinforcement &amp; encouragement</li> </ul>

Adapted from the "Therapists' Quick Reference" appearing in the book "Using Homework Assignments in Cognitive Behavior Therapy" by Kazantzis, Deane, Ronan, & L'Abate published 2003-2004 by Brunner Routledge.

## APPENDIX I: MOTIVATIONAL ENHANCEMENT WORKSHEET

### MOTIVATIONAL ENHANCEMENT WORKSHEET

..... has listed the costs and benefits of ..... versus continuing to .....

Benefits of ..... • - • - • - • - • - • -	Benefits of continuing to..... • - • - • - • - • - • -
Costs of continuing to..... • - • - • - • - • - • -	Cost of ..... • - • - • - • - • - • -

Consider social (eg friends), health (eg fitness) and financial (eg saving) benefits or costs in each box.

Importance and confidence of making the change.

Not at all important 1 -----10-----20-----30-----40-----50-----60-----70-----80-----90-----100 Very important

Not at all confident 1 -----10-----20-----30-----40-----50-----60-----70-----80-----90-----100 Very confident

What would have to change for you to see this as more important?

What would make you more confident?

**APPENDIX J: CONTROL GROUP PHONE CALL DATA COLLECTION**

## Control Group Phone Calls

ID Code: \_\_\_\_\_ Date: \_\_\_\_\_ Length of Call: \_\_\_\_\_

Generally:

---

---

---

---

- ☐ seen GP
- ☐ seen psychologist
- ☐ seen other specialist:

---

Changes to medication:

---

Changes to physical activity:

---

---

---

---

Changes to diet:

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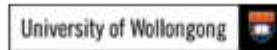
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## APPENDIX K: CORESPONDANCE WITH PARTICIPANTS

### Appointment confirmation letter



Name  
Address

Date

Dear PATIENT,

Thanks for your interest in participating in the AIMhi program (nutrition and physical activity counselling).

As a reminder, your initial assessment has been booked for:

**DATE**  
**TIME**

The appointment will be held at:

**The Northfields Clinic  
Building 22, University of Wollongong  
Northfields Drive  
Wollongong NSW 2522**

A campus map and parking permit have been included. Please be sure to use the parking spaces provided in the Northfields Clinic Bays of the Western Annex and display the parking permit on your dashboard.

Please attend the appointment dressed in attire suitable for physical activity. You may wish to bring along a towel or bottle of water for personal use.

As discussed, I have included several questionnaires. Please look through and complete as many of these as possible before your appointment. If you are not sure of how to answer a question, you will have an opportunity to discuss it at your appointment.

If you have any questions regarding the program or need to reschedule, please do not hesitate to contact me on **4221 5605 or 0406 914 541**, or by e-mail at **adrienne@uow.edu.au**.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong, Wollongong NSW 2522  
T 4221 5605 F 4221 5585 M 0406 914 541  
E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

---

## Unable to contact participant letter



Pt name  
Address

Date

Dear pt,

Your doctor, Dr. NAME, has recently referred you to the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Depression and Anxiety in Primary Care. Patients that participate in this program attend individual sessions with the dietitian and exercise physiologist to make changes in their eating patterns or physical activity. The main goal of the program is to improve mental health including depression and anxiety.

Unfortunately, I have been unable to contact you via telephone to schedule an appointment.

If you would like to participate in this program, please contact me on **4221 5605 or 0406 914 541**. Alternatively, you may wish to take the time now to indicate whether you would like to participate in this program by completing the bottom half of this letter and returning it in the reply paid envelope I have included.

If you have any further questions regarding the AIMhi program, please contact me on **4221 5605 or 0406 914 541**, or by e-mail at **adrienne@uow.edu.au**. I look forward to hearing from you.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong, Wollongong NSW 2522  
Phone 4221 5605 Fax 4221 5585 Mobile 0406 914 541  
E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

---

Name: \_\_\_\_\_

Best contact phone number: \_\_\_\_\_

☐ Yes, I would like to participate. Please contact me.

○ Best day and time to call: \_\_\_\_\_

☐ No, I do not wish to participate. Please do not contact me.

☐ I am unable to participate at the moment. I will contact you when I am ready.

## Appointment card



### The AIMhi Program: Nutrition and Physical Activity Counselling

Assessment 1: \_\_\_\_\_

Consultation 1: \_\_\_\_\_

Consultation 2: \_\_\_\_\_

Consultation 3: \_\_\_\_\_

Consultation 4: \_\_\_\_\_

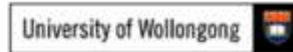
Assessment 2: \_\_\_\_\_

If you are unable to attend an appointment, please contact:

Adrienne Forsyth  
 Illawarra Institute for Mental Health, University of Wollongong  
 Northfields Avenue, Wollongong NSW 2522  
 Phone 02 4221 5605 Fax 02 4221 5585 Mobile 0406 914 541  
 adrienne@uow.edu.au

Thank you for your participation.

## Appointment offer letter



Name  
Address

Date

Dear NAME,

I'm sorry to have missed you at your previous appointment (scheduled for DATE). Should you wish to reschedule this appointment, please contact me using the details below.

As a reminder, your next appointment in the AIMhi program (nutrition and physical activity counselling) is scheduled for:

**DATE**  
**TIME**

The appointment will be held at:

**The Northfields Clinic  
Building 22, University of Wollongong  
Northfields Drive  
Wollongong NSW 2522**

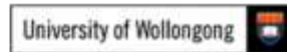
If you do not wish to keep this appointment or need to reschedule, please do not hesitate to contact me on **4221 5605 or 0406 914 541**, or by e-mail at **adrienne@uow.edu.au**.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong, Wollongong NSW 2522  
T 4221 5605 F 4221 5585 M 0406 914 541  
E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)



## Invitation to complete study



Name  
Address

Date

Dear Pt,

Thank you for your participation in the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Depression and Anxiety in Primary Care. Within this program, you are still eligible for (X number of sessions). If you would like to attend these sessions, please contact me on **4221 5605 or 0406 914 541**, or by e-mail at **adrienne@uow.edu.au** to schedule an appointment.

If you do not wish or are unable to attend these sessions, I would appreciate if you could take a few minutes to complete the enclosed questionnaires and return them in the reply paid envelope.

Thanks again for your participation. If you have any further questions regarding the AIMhi program, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong, Wollongong NSW 2522  
Phone 4221 5605      Fax 4221 5585      Mobile 0406 914 541  
E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

## Final report for participant



University of Wollongong  
Northfields Avenue  
Wollongong NSW 2522

PT NAME  
ADDRESS  
ADDRESS

DATE

Dear PT NAME,

Thank you for participating in the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Depression and Anxiety in Primary Care. A report of your results and progress has been sent to your GP. Your results are listed below for your reference.

## Mental Health

### *Depression, Anxiety and Stress Scale*

DATE 1			DATE 2		
<b>Depression</b>	/21	Indicates X depression	/21	Indicates X depression	
<b>Anxiety</b>	/21	Indicates X anxiety	/21	Indicates X anxiety	
<b>Stress</b>	/21	Indicates X stress	/21	Indicates X stress	

## Physical Health

	DATE 1	DATE 1
<b>Weight</b>	X kg	X kg
<b>Body Mass Index</b>	X kg.m <sup>-2</sup>	X kg.m <sup>-2</sup>
<b>Waist Circumference</b>	X cm	X cm
<b>Blood Pressure</b>	X/X	X/X
<b>Resting Heart Rate</b>	X bpm	X bpm
<b>Recovery Heart Rate (YMCA step test)</b>	X bpm	X bpm
<b>30-second Chair Stand Test</b>	X repetitions	X repetitions
<b>30-second Arm Curl Test</b>	X repetitions	X repetitions



## Dietary Analysis



Estimated Daily Energy Expenditure      DATE 1: X kJ      DATE 2: X kJ

### Daily Intake:

	DATE 1	DATE 2
Energy	X kJ	X kJ
Carbohydrate	X g	X g
% Energy from Carbohydrate	X %	X %
Protein	X g	X g
% Energy from Protein	X %	X %
Total Fat	X g	X g
% Energy from Fat	X %	X %
Saturated Fat	X g	X g
Monounsaturated Fat	X g	X g
Polyunsaturated Fat	X g	X g
Alcohol	X g	X g

% Energy from Alcohol	X %	X %
Thiamin	X % RDI*	X % RDI*
Riboflavin	X % RDI	X % RDI
Niacin Equivalents	X % RDI	X % RDI
Vitamin C	X % RDI	X % RDI
Folate	X % RDI	X % RDI
Vitamin A	X % RDI	X % RDI
Potassium	X % RDI	X % RDI
Magnesium	X % RDI	X % RDI
Calcium	X % RDI	X % RDI
Phosphorus	X % RDI	X % RDI
Iron	X % RDI	X % RDI
Zinc	X % RDI	X % RDI

\*RDI = Recommended Dietary Intake




Should you have any questions regarding your results, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth  
 PhD Candidate, Illawarra Institute for Mental Health  
 Ph 4221 5605 Fax 02 4221 5585 Mobile 0406 914 541  
[adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

## APPENDIX L: CORRESPONDANCE WITH GPS

### GP referral form

		
<b>AIMhi Nutrition and Physical Activity Referral Form</b>		
Name: _____		
DOB: _____		Gender: M / F
Address: _____		
Phone: (H) _____ (B) _____ (M) _____		
I am currently treating this patient for:		
<input type="checkbox"/> Depression <span style="margin-left: 200px;"><input type="checkbox"/> Anxiety</span>		
<b>Medical Clearance for Exercise</b>		
<input type="checkbox"/> I have read the exclusion criteria, this patient does not meet any of the criteria, and I feel that this patient is able to participate in an individually-tailored exercise program		
<b>Ethics Consideration</b>		
<input type="checkbox"/> I have discussed this project with the participant and I believe the participant understands what is involved		
GP Signature _____ Date _____		
GP Name _____ Phone _____		
<b>FAX TO 4221 5585</b> Or mail to Illawarra Institute for Mental Health, University of Wollongong 2522		
<b>Exclusion Criteria</b>		
<b>Cardiac</b> <ul style="list-style-type: none"> <li>▪ Uncontrolled hypertension (eg BP 180/110)</li> <li>▪ Recent onset/unstable angina pectoris</li> <li>▪ Recent unexplained or uninvestigated chest pain or exertional dyspnoea</li> <li>▪ Aortic stenosis or uninvestigated systolic murmurs</li> <li>▪ Moderate or severe CCF</li> <li>▪ Postural hypotension &gt;20mmHg</li> <li>▪ Uncontrolled arrhythmia</li> <li>▪ Uncontrolled sinus tachycardia (&gt;120 beats/min)</li> <li>▪ 3° heart block (without pacemaker)</li> <li>▪ Active pericarditis or myocarditis</li> <li>▪ Myocardial infarction or coronary intervention (eg stenting or CABG &lt; 6mths)</li> <li>▪ Cardiomyopathy – suggest inclusion only on consultation with cardiologist</li> </ul>	<ul style="list-style-type: none"> <li>▪ Other Pacemaker or valve replacement patients – on advice of cardiologist only.</li> </ul> <b>Other</b> <ul style="list-style-type: none"> <li>▪ End-stage renal failure</li> <li>▪ Acute systemic illness or fever</li> <li>▪ Recent pulmonary embolism (&lt;6mths since diagnosis)</li> <li>▪ Thrombophlebitis</li> <li>▪ Uncontrolled diabetes (random BSL's consistently &gt;20)</li> <li>▪ Orthopaedic conditions that would prohibit exercise</li> <li>▪ Metabolic disorders eg acute thyroiditis, hypokalaemia, hypovolaemia, hyperkalaemia</li> <li>▪ Organ transplant recipients</li> <li>▪ Stroke or TIA &lt;3 mths ago</li> <li>▪ Insufficient mental capacity to follow instructions</li> <li>▪ Age &lt; 18 years</li> </ul>	

## Initial report to GPs



University of Wollongong  
Northfields Avenue  
Wollongong NSW 2522

Dr. Sample  
5 Street Name  
Cityville State 1234

27<sup>th</sup> April 2006

**Re: Joe Bloggs DOB: 12/12/1950**

Dear Dr. Sample,

Thank you for referring your patient, Joe, to the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care. A fitness, nutrition and mental health assessment has been conducted with Joe. The results of this assessment are listed below.

## Mental Health

### DASS-21

<b>Depression</b>	8/21	Indicates mild to moderate depression
<b>Anxiety</b>	15/21	Indicates severe to extremely severe anxiety
<b>Stress</b>	18/21	Indicates severe to extremely severe stress

## Physical Health

<b>Weight</b>	100 kg	
<b>BMI</b>	38 kg.m <sup>-2</sup>	Obese
<b>Waist Circumference</b>	115 cm	Above recommended guidelines
<b>Blood Pressure</b>	150/87	
<b>Resting Heart Rate</b>	85 bpm	
<b>Recovery Heart Rate (YMCA step test)</b>	126 bpm	Indicates poor aerobic fitness
<b>30-second Chair Stand Test</b>	12 repetitions	Below average
<b>30-second Arm Curl Test</b>	18 repetitions	Below average

**Current Physical Activity:** Joe walks 10 minutes return trip to the shops to pick up a newspaper on Saturdays. This is well below the recommended guidelines for good health.



## Dietary Analysis



Estimated Daily Energy Expenditure 11 642 kJ

### Daily Intake:

Energy	8561 kJ
Carbohydrate	200 g
% Energy from Carbohydrate	37 %
Protein	89 g
% Energy from Protein	18 %
Total Fat	104 g
% Energy from Fat	45 %
Saturated Fat	45 g
Monounsaturated Fat	37 g
Polyunsaturated Fat	22 g
Alcohol	0 g
% Energy from Alcohol	0 %

Thiamin	112 % RDI*
Riboflavin	130 % RDI
Niacin Equivalents	114 % RDI
Vitamin C	250 % RDI
Folate	87 % RDI
Vitamin A	99 % RDI
Potassium	105 % RDI
Magnesium	130 % RDI
Calcium	142 % RDI
Phosphorus	133 % RDI
Iron	128 % RDI
Zinc	97 % RDI

\*RDI = Recommended Dietary Intake

### Assessment of usual diet:

Joe's usual diet provides adequate serves of all core food groups except vegetables. Joe's diet is high in fat, particularly saturated fat. He consumes large serves of energy-dense, nutrient-poor foods such including potato chips. Joe consumes very little fibre and chooses food with a high glycemic index.

### Lifestyle Goals Negotiated with Joe:

1. To walk 10 minutes before work each day.
2. To assess my hunger before I eat.
3. To add one serve of vegetables at dinner.

Joe is confident in his ability to make these changes, and feels that they will help him to lose weight and increase his energy levels.

A review appointment with Joe has been scheduled for one month's time. Should you have any questions regarding Joe's participation and progress in the AIMhi program, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong NSW 2522

## Review appointment reports to GPs



University of Wollongong  
Northfields Avenue  
Wollongong NSW 2522

GP NAME  
ADDRESS  
ADDRESS

DATE

**Re: NAME DOB:**

Dear Dr. GP NAME,

Thank you for referring your patient, NAME, to the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care. NAME attended a review nutrition and physical activity appointment. Since the last appointment NAME has ..... At this appointment, NAME has chosen to .....

COMMENT ON CONFIDENCE, ETC.

A review appointment with NAME has been scheduled for XXX week's time. Should you have any questions regarding NAME's participation and progress in the AIMhi program, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth  
PhD Candidate, Illawarra Institute for Mental Health  
Ph 4221 5605 Fax 02 4221 5585 Mobile 0406 914 541  
adrienne@uow.edu.au

## Final report to GPs



University of Wollongong  
Northfields Avenue  
Wollongong NSW 2522

GP NAME  
ADDRESS  
ADDRESS

DATE

**Re: NAME DOB:**

Dear Dr. GP NAME,

Thank you for referring your patient, NAME, to the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care. NAME has now completed the program including X assessments and 4 consultations with the dietitian and exercise physiologist.

Lifestyle goals negotiated with NAME at the commencement of the program included:

1. XXXXX
2. XXXXXXX
3. XXXXXXXXX
4. XXXXXXXXXX

Over the course of the program, NAME has .....

NAME has been successful in achieving .....

To maintain these outcomes, I recommend that NAME.....

The results of NAME's fitness, nutrition and mental health assessments are listed below.

## Mental Health

### DASS-21

	DATE 1		DATE 2	
<b>Depression</b>	/21	Indicates X depression	/21	Indicates X depression
<b>Anxiety</b>	/21	Indicates X anxiety	/21	Indicates X anxiety
<b>Stress</b>	/21	Indicates X stress	/21	Indicates X stress





## Physical Health



	DATE 1		DATE 1	
<b>Weight</b>	X kg		X kg	
<b>BMI</b>	X kg.m <sup>-2</sup>	DESCRIPTION	X kg.m <sup>-2</sup>	DESCRIPTION
<b>Waist Circumference</b>	X cm	X recommended guidelines	X cm	X recommended guidelines
<b>Blood Pressure</b>	X/X		X/X	
<b>Resting Heart Rate</b>	X bpm		X bpm	
<b>Recovery Heart Rate (YMCA step test)</b>	X bpm	Indicates X	X bpm	Indicates X
<b>30-second Chair Stand Test</b>	X repetitions	DESCRIPTION	X repetitions	DESCRIPTION
<b>30-second Arm Curl Test</b>	X repetitions	DESCRIPTION	X repetitions	DESCRIPTION

**Previous Physical Activity:** PREVIOUSLY, COMPARED TO recommended guidelines for good health.

**Current Physical Activity:** CURRENTLY, COMPARED TO recommended guidelines for good health.

## Dietary Analysis

**Estimated Daily Energy Expenditure**      DATE 1: X kJ      DATE 2: X kJ

### Daily Intake:

	DATE 1	DATE 2
<b>Energy</b>	X kJ	X kJ
<b>Carbohydrate</b>	X g	X g
<b>% Energy from Carbohydrate</b>	X %	X %
<b>Protein</b>	X g	X g
<b>% Energy from Protein</b>	X %	X %
<b>Total Fat</b>	X g	X g
<b>% Energy from Fat</b>	X %	X %
<b>Saturated Fat</b>	X g	X g
<b>Monounsaturated Fat</b>	X g	X g
<b>Polyunsaturated Fat</b>	X g	X g
<b>Alcohol</b>	X g	X g

<b>% Energy from Alcohol</b>	X %	X %
<b>Thiamin</b>	X % RDI*	X % RDI*
<b>Riboflavin</b>	X % RDI	X % RDI
<b>Niacin Equivalents</b>	X % RDI	X % RDI
<b>Vitamin C</b>	X % RDI	X % RDI
<b>Folate</b>	X % RDI	X % RDI
<b>Vitamin A</b>	X % RDI	X % RDI
<b>Potassium</b>	X % RDI	X % RDI
<b>Magnesium</b>	X % RDI	X % RDI
<b>Calcium</b>	X % RDI	X % RDI
<b>Phosphorus</b>	X % RDI	X % RDI
<b>Iron</b>	X % RDI	X % RDI
<b>Zinc</b>	X % RDI	X % RDI

\*RDI = Recommended Dietary Intake



***Assessment of usual diet:***

PREVIOUS VS CURRENT.

Should you have any questions regarding NAME's participation in the AIMhi program, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth  
PhD Candidate, Illawarra Institute for Mental Health  
Ph 4221 5605 Fax 02 4221 5585 Mobile 0406 914 541  
adrienne@uow.edu.au

## Report to GP – patient declined to participate / unable to contact patient



University of Wollongong  
Northfields Avenue  
Wollongong NSW 2522

Practice Name  
Address  
Suburb NSW Post Code

Date

Dear Dr. ABC,

**Re: (Patient Name)                      DOB: 123**

Thank you for referring your patient, (name), to the AimHi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care. Unfortunately,

- a) I have been unable to contact (name) by phone or mail to schedule an appointment.
- b) (name) does not wish to participate in the AimHi program at this time.

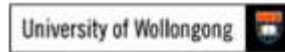
I would be happy to see (name) at a later date.

Thank you again for your referral.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong NSW 2522  
Ph 4221 5605 Fax 02 4221 5585 Mob 0406 914 541  
adrienne@uow.edu.au

## Report to GP – patient did not complete the program



GP NAME  
ADDRESS

DATE

Dear Dr. GP,

**RE:**            **DOB:**

Thank you for referring your patient, NAME, to the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Depression and Anxiety in Primary Care. Unfortunately, NAME did not complete the program, and is still eligible for XXX. If NAME would like to attend these sessions, NAME can contact me on **4221 5605 or 0406 914 541**, or by e-mail at **adrienne@uow.edu.au** to schedule an appointment.

Thanks again for your referral. If you have any further questions regarding NAME's participation in the AIMhi program, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong, Wollongong NSW 2522  
Phone 4221 5605      Fax 4221 5585      Mobile 0406 914 541  
E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

## APPENDIX M: PARTICIPANT INTERVIEW DOCUMENTS

### Invitation to attend interview



«Name»

«Address»

«Suburb» NSW «Post\_Code»

Date

Thank you for your participation in the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Depression and Anxiety in Primary Care. As a further part of this study, we are collecting feedback from participants on their views on the program.

You are invited to attend an individual interview to share your experience and views of the Program. The interview will take approximately 30 minutes and be held at the University. Responses will be confidential and the interview will be held with a Dietitian / Exercise Physiologist that did not take you through the program to allow you to speak about both positive and negative experiences of the program freely.

At the time of this interview you also have the opportunity to attend a review assessment of your diet and exercise progress if you wish. This will take approximately 60 minutes and will be conducted at the same time as the interview.

To make a booking please contact Adrienne or Kate on 42215605 or by email [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au). Thank you again for your participation in the program, if you have any further questions regarding the AIMhi program, please don't hesitate to contact me.

Kind regards,

Adrienne Forsyth APD MAAESS AEP  
PhD Candidate, Illawarra Institute for Mental Health  
University of Wollongong, Wollongong NSW 2522  
T 4221 5605 F 4221 5585  
E-mail [adrienne@uow.edu.au](mailto:adrienne@uow.edu.au)

---

## Interview questions

1. How did you find out about the AIMhi diet and exercise program?
2. Why did you decide to participate in the program?
3. What were your expectations when commencing the program?
4. How did you feel about the program before you came in for your first appointment?
5. How did you find your first assessment? Was it easy/difficult to complete? Did you have any difficulties providing sufficient detail about your diet?
6. After your initial assessment, what were your expectations for the program?
7. Did the program meet your expectations? If yes, how? If not, why not?
8. What was it about your relationship with your DEP that helped or hindered progress toward your goals?
9. Did you miss any appointments? If so, why?
10. Did you find it difficult to come in for your appointments?
11. Did you have any difficulty contacting the DEPs?
12. Control: Did the regular phone calls before you started the program change the way you behaved (diet/exercise)? In what ways did the brief telephone contacts help or hinder you in achieving your diet and exercise goals?
13. Control: Before commencing the program did you enlist the support of anyone else (psychologist/GP/PT/partner/friend/etc) to make lifestyle changes?
14. What other measures have you and your GP implemented to improve your mental health (psych/meds/other)?
15. Do you feel that you benefited from participation in this program? How?
16. Did you achieve the results you hoped for? Describe.
17. What did you find helpful about the program?
18. What did you find challenging about the program?
19. What were the barriers to your participation in the program?
20. How could we improve the program?
21. Were there enough appointments?
22. Were the appointments too close together or too far apart?
23. What are your goals for the future? How are you planning to achieve these goals?
24. Is there anything else that you would like to comment on?
25. To what extent have you been able to sustain some of the activities you were working on with your DEP following the program?

## Interview responses

How did you find out about the AIMhi diet and exercise program?	
101	Doctor
104	GP
142	Doctor recommended it.
148	GP
169	Doctor Simpson.
172	Psychologists desk – pamphlet.
175	Psychiatrist – Dr Heiner.
177	Doctor referral
179	Through GP
182	Dr Heiner
187	GP (had noticed weight gain)
191	Doctor.
192	Dr Cathy Allen
197	Referral from GP.
303	GP
315	GP
Why did you decide to participate in the program?	
101	Thought it would benefit him with weight loss.
104	Exercise and diet would help health; thought it would be a good opportunity.
142	Needed to lose weight for good health.
148	Doctor's advice – keep on right road
169	Help with depression.
172	Shocked at recent significant weight gain and emotional eating and acknowledged that there is something wrong.
175	I cooperate with anything that will improve my 'state'.
177	Enjoy doing research. See the results.
179	Looking at other alternatives for medication. Muscle and joint pain linked.
182	Feeling flat. Sleep apnoea – left work. Put on weight.
187	Had tried to lose weight on my own but kept gaining weight.
191	Improve lifestyle.
192	To improve fitness.
197	Learn more about how diet and exercise is related to depression.
303	Try this before going on meds for sugar levels.
315	Because suffering from anxiety and depression due to pain.

---

What were your expectations when commencing the program?

---

- 101 High  
 104 Didn't expect to have support of someone interested in the progress through the program – best part of the program. Knew it would help with depression, weight loss and reduced risk of disease. Was hesitant coming in.  
 142 Weight loss and associated benefits.  
 148 Assist to keep healthy, but did not have huge expectations of weight loss.  
 169 Increase fitness, decrease depression.  
 172 Didn't have high expectations – that would be supported, acknowledgements of achievement.  
 175 More psychology-oriented, but has been pleasantly effective from a physical encouragement point of view.  
 177 No expectations.  
 179 Get incentive to exercise – look after joints. Help with feelings of being low.  
 182 Hoping to be more food aware, lose weight, increase exercise, build up arms. Outside assistance – motivation.  
 187 I thought there would be advice about nutrition and exercise and motivational – to break old habits.  
 191 Exercise program. More direction in activities.  
 192 Not sure.  
 197 Increase knowledge about diet and exercise related to depression.  
 303 To lose weight and feel better about myself.  
 315 'Not much'.
- 

---

How did you feel about the program before you come in for your first appointment?

---

- 101 Nervous  
 104 Feeling hesitant and demoralised due to mental health and family situation. Felt better knowing there would be someone to help organise healthy lifestyle and support.  
 142 Anxious to achieve significant weight loss. Expected to be able to maintain weight loss.  
 148 Apprehensive about ax (unknown what was going to be done)  
 169 Sceptical.  
 172 Very anxious. Outside of comfort zone.  
 175 Positive.  
 177 Interested, curious.  
 179 Curious. Not nervous. How nutrition, PA and mental health linked and be dealt with.  
 182 Looking forward to it.  
 187 Nervous. I'd really not wanted to advertise the weight gain – I haven't been able to deal with it, used to be super slim.  
 191 Looking forward to it.  
 192 Nervous.  
 197 Nervous – aware of status and improvements.  
 303 Was really in the dumps, had lost my job, felt worthless.  
 315 'I thought you were going to get me to do things that were going to make me worse',
-



---

How did you find your first assessment? Was it easy/difficult to complete? Did you have any difficulties providing sufficient detail about your diet?

---

- 101 Difficult first assessment. No difficulties providing diet history.  
 104 Diet info not as detailed as what she was expecting. Tried to be as honest as possible.  
 142 Easy to complete. No problems.  
 148 Step test very hard. No, it was explained very well.  
 169 Okay. Reasonable difficulty. Diet details fine.  
 172 Step test was hardest. Could not complete. Diet – not difficulty as had recently changed diet.  
 175 That I wasn't getting through (my psychological condition or need) – because I didn't know what they were – questions were a bit simplistic and I expected more analytical/knowledgeable. Physical – easy. Diet – easy.  
 177 Easy, no diet problems.  
 179 Easy to complete. Quantity to judge difficult initially. Size + frequency to recall.  
 182 Good experience.  
 187 I felt less anxious afterwards. Arm okay, chair stands and walking were tricky, I really hadn't pushed myself for a while.  
 191 Exercise test was difficult. Diet assessment was no problem.  
 192 Good and pretty easy.  
 197 Good. Reasonably simple. Difficult to recall. Food journal helped.  
 303 Very hard – I'd sort of gotten out of any exercise at all, it killed me, I was very unfit.  
 315 My ankle went on the step test. Sore hip and back. No difficulties with diet because did diet trials previously.
- 

---

After your initial assessment, what were your expectations for the program?

---

- 101 Increase fitness and lose weight.  
 104 Thought it would help. Attitude more positive.  
 142 Was still anxious about losing weight.  
 148 No, they didn't change form prior (increased mobility, increased clarity of mind).  
 169 Same as above.  
 172 Was happy to go along to program.  
 175 That my progress would be monitored.  
 177 More vigilant in doing exercise, striving to achieve the goals. Kept on targets, was something to work towards.  
 179 Gain hints of exercise, food but up to individual to implement. Became clearer what program involved – initially not sure.  
 182 Same as before first assessment.  
 187 Some guidance to where I was going wrong, to explain the weight gain.  
 191 Hope for a better lifestyle. A good exercise program as before it was non-existent. To challenge himself to do 5 days exercise a week.  
 192 Not sure, wait and see.  
 197 Guidance for diet and exercise.  
 303 Same as before.  
 315 .
-

---

Did the program meet your expectations? If yes, how? If not, why not?

---

- 101 Yes, enough info and support.  
 104 Yes. Helped organise life. Better mental health outcomes.  
 142 It hasn't because I haven't lost weight.  
 148 Yes, and more. Able to sustain activity. Very motivating. Ongoing support made difference.  
 169 Yes, but inactive recently because of injury.  
 172 Yes – informative, homework sheets helpful, thinking about what was to be done.  
 175 Yes – I had preconceived ideas and the program was not that, it was a pleasant, positive outcome. Very/extremely tolerant, non-punishing.  
 177 Made self-reflection on diet, exercise and feelings.  
 179 Yes. Non invasive, didn't dread coming to appointment. Raised consciousness on issues. 'Pick me up' – positive focus. Exercise – incentive to act, not put it off.  
 182 Enjoyed it very much. Knee injury made it difficult.  
 187 Yes, when I was on the vegetarian diet I was lacking energy, so Kate identified iron deficiency and gave iron information. When having motivation issues with exercise she advised me ways to get around that.  
 191 Yes. Improved lifestyle.  
 192 Yes – helped to improve fitness. Learnt about healthy eating.  
 197 Goals for each session were good.  
 303 Yes, each time I came I tried to improve on what I did last time and obviously it's been working.  
 315 .
- 

---

What was it about your relationship with your DEP that helped or hindered progress towards your goals?

---

- 101 Understanding. Didn't place pressure. Supportive.  
 104 Talking. She showed an interest and gave encouragement.  
 142 Relationship was okay, not sure why didn't lose weight.  
 148 Talking about what plans had for the week. Help to guide realistic goals.  
 169 Very helpful.  
 172 .  
 175 A sense of lighthearted, genuine care and support (at the end of my first ax, I wondered if they would really get it, being so young) but was great.  
 177 Good relationships, helped progress. Very knowledgeable.  
 179 She is open, personal interest taken – followed up on previous talks. Ask quite depth questions, not gloss over. Non-judgemental and encouraging.  
 182 Help.  
 187 I felt like Kate was very approachable and keen to answer questions.  
 191 Helped him to focus on the tasks at hand. Stopped him from 'slacking off'.  
 192 .  
 197 Helped with setting realistic goals and changing goals. Supportive. Reinforcement with program.  
 303 I knew Kate – my daughter went to the same school so wasn't as daunting and she was really encouraging.  
 315 I found Kate pretty good. Her expectations were high, I wasn't confident in being able to accomplish this – I think Kate didn't think I wanted to have a go.
-

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Did you miss any appointments? If so, why?

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101 2 – sickness and memory.  
 104 No.  
 142 Rescheduled 2 - forgot one, one for work commitments.  
 148 No.  
 169 One, because of injury.  
 172 No.  
 175 No.  
 177 Yes, sick with the flu.  
 179 Yes – called in to work. But made it up later.  
 182 Missed no. 2. Knee injury – pointless doing exercise ax.  
 187 No.  
 191 No.  
 192 Not sure.  
 197 One, due to being called elsewhere.  
 303 No.  
 315 No.

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Did you find it difficult to come in for your appointments?

---

101 No.  
 104 No.  
 142 Only when working.  
 148 No.  
 169 No.  
 172 No.  
 175 On time – hard to get up in the morning.  
 177 Nope.  
 179 Not at all.  
 182 No. parking is hard but sticker helped.  
 187 No.  
 191 No.  
 192 Got a lift, hard to find at first.  
 197 No.  
 303 No.  
 315 No.

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Did you have any difficulty contacting the DEPs?

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101 No.  
 104 No, due to telephone and email messages.  
 142 Have had difficulty at first. Email made it easier.  
 148 No.  
 169 No.  
 172 No.  
 175 Haven't tried.  
 177 No.  
 179 No.  
 182 Email.  
 187 No.  
 191 No.  
 192 .  
 197 Easy contact.  
 303 Couple of times during control period played phone tag.  
 315 No.

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Control: Did the regular phone calls before you started the program change the way you behaved (diet/exercise)? In what ways did the brief telephone contacts help or hinder you in achieving your diet and exercise goals?

---

101 N/A  
 104 N/A  
 142 N/A  
 148 Not a lot then. Started after had second ax.  
 169 N/A  
 172 N/A  
 175 N/A  
 177 N/A  
 179 N/A  
 182 N/A  
 187 N/A  
 191 N/A  
 192 N/A  
 197 Increase awareness with assessment. Regular phone calls.  
 303 Yes – I was trying to walk more and watch what I was eating.  
 315 N/A

---

---

Control: Before commencing the program did you enlist the support of anyone else (psychologist/GP/PT/partner/friend/etc) to make lifestyle changes?

---

101 N/A  
 104 N/A  
 142 N/A  
 148 Saw/attended group program for diabetes with dietitian and diabetes educator.  
 169 N/A  
 172 N/A  
 175 N/A  
 177 N/A  
 179 N/A  
 182 Yes – GP & specialist.  
 187 N/A  
 191 N/A  
 192 N/A  
 197 Housemate healthy therefore mainly individual. Friend joined the gym.  
 303 No, I just did it by myself once I knew what I had to do (from GP).  
 315 N/A

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What other measures have you and your GP implemented to improve your mental health (psych/meds/other)?

---

101 Haven't seen GP since commencing program.  
 104 .  
 142 .  
 148 Nil.  
 169 Tranquiliser tablets. Previously psychologists and hypnotherapy.  
 172 psychologist  
 175 Valium, counselling.  
 177 Mainly a job – locally.  
 179 Back onto medication – in consult with psychologist. EP – exercises given.  
 182 Medications have changed AD + Ritalin to maintain focus. Seeing psych specialist.  
 187 Changes to medications (to reduce weight gain). Meds, psychiatrist, counsellor.  
 191 Seeing a physiotherapist.  
 192 Medication for nerves. See another doctor.  
 197 Changed medication, saw an improvement. Counsellor.  
 303 .  
 315 Psychologist every 2-3 weeks. Antidepressants.

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Do you feel that you benefited from participation in this program? How?

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- 101 Yes, increased fitness and improved diet.  
 104 Yes – encouraging environment. Started taking responsibility of own health and behaviour.  
 142 No. Not really as real aim was to lose weight.  
 148 Yes. Increased mobility. Increased clarity of min. increase alertness. Substantial weight loss.  
 169 Yes. Decreased depression days.  
 172 Yes – acknowledges depression, now can control diet/exercise and emotional eating. Homework sheets helpful.  
 175 Yes, it's been pleasant. I'm really impressed that there was an outcome. I found it really encouraging – the reviewing of the goals and the non-judgemental, lighthearted encouragement.  
 177 Yes.  
 179 Yes. Open your mind to other ways to lift mood – go run. To make the effort – draw on in future.  
 182 Yes overall, regressed due to injury.  
 187 Yes, it helped me realise that exercise isn't a chore, that it can be fun and beneficial. It helped me modify my diet.  
 191 Yes. Feeling healthy.  
 192 .  
 197 Yes, increased awareness over choice and how it can be changed.  
 303 Yes, definitely, feeling so much better mentally and physically.  
 315 Yes, by you people saying that what I'm trying to do is okay, that what I'm trying to put into practice is the right thing.
- 

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Did you achieve the results you hoped for? Describe.

---

- 101 Yes, increased fitness and improved diet.  
 104 No – did not get to ideal weight, but has decreased portion sizes and cut down on biscuits.  
 142 No. No weight loss and weight gain after program finished.  
 148 Yes, and still achieving. Have a regular exercise pattern. Not craving unhealthy foods at all. Healthy diet.  
 169 No, because of injury.  
 172 Yes – weight loss continued. Health eating habits. Twice daily exercise. Mentally up/down but now acknowledges feeling. Reinforced habits.  
 175 Yes – especially the last review.  
 177 Yes. Was exercising regularly (up until commencement of new job)  
 179 Increased fitness. Chronic pain still issue. Feel better about self.  
 182 In terms of diet, more aware. Feels as if no injury would have achieved more.  
 187 I was hoping to lose more weight.  
 191 Yes. Hoped to get his mind set to do exercises and eat healthy most days.  
 192 Yes. Fitness a bit better.  
 197 Eating more healthy. Increased physical activity – gym.  
 303 Yes, but I still want to achieve more, iwant to get down to 70 and then I'll feel really good.  
 315 Wanted to lose 5 kg but have gone the other way (but have been watching what I eat). I used to feel bloated and I don't anymore.
-

---

### What did you find helpful about the program?

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- 101 Easy to undertake.
  - 104 Encouragement. Goal setting. Information about fats.
  - 142 Four ingredients cookbook. Possibilities/hints. Diet analysis.
  - 148 Ongoing support. Setting goals. Not having high expectations. Not weight focused goals, more lifestyle focused.
  - 169 Exercise program & diet.
  - 172 Homework sheets – goal setting. Information sheets.
  - 175 Reviewing of the goals. Walking to get here (getting to go to Botanical Gardens). Handouts on budgeting, veggies, etc. Kate responded to my enquiries.
  - 177 Knowledge.
  - 179 Second visit – walk up call (food graphs – breakdown of intake). Sheets to write down goals and mindful of points to do.
  - 182 More aware of food – had background knowledge reasons for eating/not eating food.
  - 187 I found it motivational because of the meetings and being weighed keeps you motivated.
  - 191 Staying focused on the task. Designing an exercise program.
  - 192 .
  - 197 No cost, therefore easily accessible. DEP – increased awareness.
  - 303 Just the encouragement I go. Seeing results boosts you up.
  - 315 Being able to speak about my diet and hearing what you guys had to say and encouraging me that what I’m doing is okay.
- 

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### What did you find challenging about the program?

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- 101 The fitness/exercise component.
  - 104 Having enough energy to do exercise. Recovery from pregnancy/birth made program difficult.
  - 142 Eating small meals regularly. Organise meals/plan weekly menu/daily menu. Cooking.
  - 148 Step test.
  - 169 Trying to keep up with exercise program.
  - 172 Step-ups.
  - 175 Self-imposed challenge of imposing the standard of the goals on myself. Got better when I stressed out less about them – helped when Kate got me to write achievable goals, be kinder to myself.
  - 177 Finding the time to live up to the goals set.
  - 179 Sticking to program. Other things come up and skipping exercise – break habit to stick to it.
  - 182 Maintaining consistency after knee injury. Making sure to set aside time for exercises.
  - 187 Try to fulfil my end of the bargain – some weeks I wasn’t keen to do 3-4 exercises per week.
  - 191 Changing lifestyle. Keeping exercise program running.
  - 192 Nothing really.
  - 197 Food journal – realisation of sub-optimal diet.
  - 303 Nil.
  - 315 Doing the extra 30 min (walking) was very challenging. I did the best I could but doing little bits and pieces were better for me.
-

---

### What were the barriers to your participation in the program?

---

- 101 None.  
 104 Mental confusion. Time constraints. Looking after children. Lack of energy (in bed by 8 pm).  
 142 Finding work. Finances. Burden of planning weekly shopping/daily menus.  
 148 No barriers as goals were always very achievable.  
 169 No.  
 172 Hernia.  
 175 No.  
 177 Excuses to exercise to yourself.  
 179 Nothing major.  
 182 Knee injury.  
 187 Birthday – interfered with motivation plus has wine and big meals. Depression this week has been a big barrier.  
 191 Cold weather.  
 192 .  
 197 Beginning – depression made it difficult mentally. Parking permit – made it convenient.  
 303 Nil.  
 315 No.
- 

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### How could we improve the program?

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- 101 ...  
 104 Give everyone dietary guideline books.  
 142 ?  
 148 ?  
 169 Too long between first and second ax.  
 172 More visits – wish it was ongoing!  
 175 The program meets the objectives of helping people develop and maintain a lifestyle change, then you have met that objective.  
 177 No, good as it is.  
 179 If things were needed they were available. Information on vitamins may be useful.  
 182 No.  
 187 A phone call on the weeks when there are no appointments – to follow up and see if sticking to homework.  
 191 N/A  
 192 .  
 197 Increased education on food/diet and effect on mental state (interaction).  
 303 Don't think you can improve it.  
 315 Program was not designed for people with injuries so not right for me. Program doesn't take into account a person with a severe injury, something that changes their life. With Kate, I was under the impression that she thought I didn't want to do things.
-



---

Were there enough appointments?

---

- 101 Yes.  
 104 Yes. Well organised.  
 142 No.  
 148 Yes.  
 169 Yes.  
 172 Yes.  
 175 Yes – the 4 week break was tremendous because it showed me that I really did achieve my goals, it was a really encouraging factor.  
 177 Yes.  
 179 Yes.  
 182 Yes.  
 187 No – I felt there could have been more, and then I could have seen more change (and over a longer period of time).  
 191 Yes.  
 192 .  
 197 Yes.  
 303 Yes.  
 315 For me there were enough appts.
- 

---

Were the appointments too close together or too far apart?

---

- 101 No.  
 104 Fine. Others might need phone calls in between to increase motivation.  
 142 Would like more regular appointments over a longer time frame. Even phone calls.  
 148 Just right – easy to handle and not stressful.  
 169 Only between first and second (ax?)– too far apart.  
 172 Was okay.  
 175 No, they were ideal how they were structured.  
 177 No, just right – realistic.  
 179 No, good spread. Initially good closer then time to work on set things.  
 182 Approved of the way is was close together at the start then got less frequenct to let you get on with it.  
 187 The right distance apart but would be nice to have a follow-up phone call in between. Two weeks gives time to get homework done.  
 191 No – spacing of appointments were fine.  
 192 .  
 197 Good structure.  
 303 Fortnightly was good.  
 315 The gap was a bit too long at the end (4 weeks) – maybe a 10 minute check just to get blood pressure, etc.
-

---

What are your goals for the future? How are you planning to achieve these goals?

---

- 101 To stay health and fit by continuing the program.  
 104 Ideal within 1-2 years to cut portions in half. Walking, swimming, gym. Educate children, scripture classes. Healthy, be fit and active.  
 142 Lose weight. EP, supervised exercise, continue with current diet.  
 148 Regular exercise. Watch diet – maintain the same.  
 169 Increase fitness and improve diet. Carrying on the exercises and diet plan.  
 172 Keep following same path. Regular exercise - does not feel like will every go back to being sedentary. Same nutrition goals.  
 175 Within 12 months I would like to know how to read the signs of oncoming depression and be kinder to myself and be in a state where I am creative. Ask the psych if there are any programs. Be accepting and chip away slowly.  
 177 To continue exercise and maintain weight. Yes, plan to achieve them.  
 179 Stick to regular exercise. Gym class. Increase diet variety (veggies, seafood). Routines going, now keep it going.  
 182 Improve fitness – bike, weights, exercise ball. Lose weight – change serving sizes. Feel weight loss will happen as exercise increases.  
 187 Get into some cardio when I feel ready to really drop to weight. Join a gym. Take up a jazz and ballroom dance class.  
 191 To keep going with both healthy diet and exercise and to be more sociable.  
 192 Improve healthy eating and fitness.  
 197 Weight loss – increase visits to gym. Increased CV fitness – increase weight training for insulin resistance.  
 303 To continue want I'm doing and to maintain it.  
 315 Lose a little bit more weight around my belly and get my blood pressure down. By watching what I eat – make sure that everything I eat is under 1- and have my 5 and 2.
- 

---

Is there anything else that you would like to comment on?

---

- 101 No.  
 104 .  
 142 Just talking was not enough. Still confused over how to lose weight.  
 148 Very good program.  
 169 .  
 172 .  
 175 Everyone's been really pleasant, congratulations for being available.  
 177 .  
 179 .  
 182 No.  
 187 Maybe some more advice on what foods you should be eating and portion size.  
 191 .  
 192 .  
 197 Importance of having small achievable goals with people with depression, due to heightened effect of failure.  
 303 Thank you and kate for getting me up and moving.  
 315 It think it's a good program overall, it was worthwhile for me, but up to the individual to do their own thing.
-

---

To what extent have you been able to sustain some of the activities you were working on with your DEP following the program?

---

101

104 Maintaining: ½ portion sizes, no biscuits, walking 20-25 min 2/7, no chocolate.

142 Eating small regular meals. Have food on her to avoid snacking or binging. Swimming 3-4/7 for 30-45 min.

148 All of them – still doing all. Increased exercise and maintained diet.

169 Wants to carry on with exercise but can't because of injury.

172 All activities – walking 10 km every morning and 6-8 km every afternoon. Following diabetes diet successfully. Losing weight still. Diet dairy everyday and thoughts and feelings.

175 .

177 Has been good, returning to work was a challenge, but the usual program will be returned to again.

179 N/A

182 Difficult – recurring knee problem. New job takes up time &amp; energy. Not as much as is ideal.

187 .

191 Trying to keep up the exercise 5-6 days a week.

192 .

197 Increase gym and healthy food habits (structured/specific diet).

303 N/A

315 The program validated what I was doing.

---

## APPENDIX N: GP SURVEY AND RESULTS

### GP survey



### The AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care

Thank you for your interest in the AIMhi Program: Nutrition and Physical Activity Counselling for Patients with Mental Illness in Primary Care. We have now reached capacity in the program and **will no longer be accepting referrals**. We would appreciate your feedback. To assist us in developing improved, sustainable programs in the future, please complete the following questions and **fax to 4221 5585**.

This program was appropriate for:

- ☐ none of my patients
- ☐ few of my patients
- ☐ many of my patients
- ☐ all of my patients

Referring to the program was:

- ☐ easy
- ☐ difficult

To refer I used:

- ☐ paper referral forms
- ☐ electronic referral templates

The quality of the services provided was:

- ☐ poor
- ☐ fair
- ☐ good
- ☐ very good
- ☐ excellent

I believe this program affected my patients' *mental* health:

- ☐ positively
- ☐ not at all
- ☐ negatively

I believe this program affected my patients' *physical* health:

- ☐ positively
- ☐ not at all
- ☐ negatively

The feedback I received from the dietitian/exercise physiologist was:

- ☐ too brief
- ☐ adequate
- ☐ too lengthy

The feedback I received from the dietitian/exercise physiologist was:

- ☐ too infrequent
- ☐ adequate
- ☐ too frequent

Please provide a suggestion for improvement:

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Thank you for your feedback. Please fax to 4221 5585.

## GP survey responses

Question	Number of responses
<b>This program was appropriate for:</b>	
None of my patients	1
Few of my patients	1
Many of my patients	7
All of my patients	1
<b>Referring to this program was:</b>	
Easy	9
Difficult	1
<b>To refer I used:</b>	
Paper referral forms	10
Electronic referral templates	0
<b>The quality of the services provided was:</b>	
Poor	1
Fair	1
Good	4
Very good	5
Excellent	0
<b>I believe this program affected my patients' mental health:</b>	
Positively	8
Not at all	2
Negatively	0
<b>I believe this program affected my patients' physical health:</b>	
Positively	8
Not at all	2
Negatively	0
<b>The feedback I received from the DEP was:</b>	
Too brief	1
Adequate	8
Too lengthy	1
<b>The feedback I received from the DEP was:</b>	
Too infrequent	1
Adequate	9
Too frequent	0

## APPENDIX O: RELIABILITY STUDY DOCUMENTS

### Reliability study information sheet

#### UNIVERSITY OF WOLLONGONG

#### PARTICIPANT INFORMATION SHEET

#### **Inter-rater reliability of assessment tools used to measure diet quality and physical fitness**

This sheet provides information about *Inter-rater reliability of assessment tools used to measure diet quality and physical fitness*. Adrienne Forsyth is conducting this research as part of a PhD supervised by Assoc. Prof. Peter Williams and Prof. Frank Deane in the School of Health Science and Psychology at the University of Wollongong. The research also involves other researchers at the Illawarra Institute for Mental Health at the University of Wollongong. Funding for this research is provided by the National Health and Medical Research Council.

#### **Background:**

A research program is being conducted to investigate the feasibility and effectiveness of providing individual counselling from a dietitian/exercise physiologist for primary care patients with depression and/or anxiety. As part of this research, all participants undertake an assessment of their diet quality and physical fitness prior to and on completion of their series of individual counselling sessions. Multiple investigators have been involved in this program, making it important to understand the inter-rater reliability of the measures that are being used. The aim of this project is to evaluate the inter-rater reliability of the diet quality and physical fitness assessment.

#### **Details of the study:**

The assessments undertaken in this study are free. There will be no cost for you to participate in this study at any time.

You will be asked to complete three assessments of your diet quality and physical fitness with a dietitian/exercise physiologist, or a trained student dietitian/exercise physiologist. This will involve answering questions about your eating habits, taking measurements including your waist circumference, weight and height, blood pressure, and completing simple exercise tests. The exercise tests will require you to step for three minutes, and to do simple leg and arm exercises including standing up out of a chair and performing arm curls with a small hand weight. You will be asked to provide a summary of your current health issues. In total, this assessment should take 60 - 90 minutes.

You will be asked to return for a follow-up assessment at the same time each day until you have completed three assessments.

**Important information:**

You will be provided with your assessment results. These results do not provide advice regarding your diet or exercise, and any lifestyle changes you make as a result of these assessments should be done in consultation with a dietitian, exercise physiologist, or general practitioner.

Although this research is being conducted at the University of Wollongong, it will in no way affect your participation in any academic or extra-curricular programs at the university. Adrienne Forsyth, and other investigators will be present only to conduct research. You are free to refuse to participate, or to withdraw your consent at any time. Refusal to participate in this study will not affect your relationship with the University of Wollongong.

All personal information collected during the course of this research will be stored in locked files at the University of Wollongong, and will be identified only by a code number. You will not be identifiable in any publications that come from this research. With your consent, your health information collected in the interview with the dietitian and exercise physiologist will be provided to your doctor to assist in your medical care. Your personal information will not be made available to anyone else, for any reason.

If you have any questions or concerns about your participation in this research, please do not hesitate to contact Adrienne Forsyth on 4221 5605 or Assoc. Prof. Peter Williams on 4221 4085. If you have any concerns or complaints regarding the way in which the research is or has been conducted, you should contact the Secretary of the University of Wollongong Human Research Ethics Committee on (02) 4221 4457.

## Reliability study consent form

### UNIVERSITY OF WOLLONGONG

#### CONSENT FORM

#### **Inter-rater reliability of assessment tools used to measure diet quality and physical fitness**

#### **Adrienne Forsyth**

I have been given information about *Inter-rater reliability of assessment tools used to measure diet quality and physical fitness* and discussed the research project with Adrienne Forsyth who is conducting this research as part of a PhD supervised by Assoc. Prof. Peter Williams and Prof. Frank Deane in the School of Health Science and Psychology at the University of Wollongong.

I understand that if I consent to participate in this project I will be asked to complete assessments of my diet quality and physical fitness, including performing simple exercises.

I have been advised of the potential risks and burdens associated with this research, which could include injury due to exercise, and have had an opportunity to ask Adrienne Forsyth any questions I may have about the research and my participation.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect my relationship with the University of Wollongong in any way.

If I have any enquiries about the research, I understand I can contact Adrienne Forsyth on 4221 5605 and Dr. Peter Williams on 4221 4085 or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, Research Services Office, University of Wollongong on 4221 4457.

By signing below I am indicating my consent to participate in the research entitled *Inter-rater reliability of assessment tools used to measure diet quality and physical fitness*, conducted by Adrienne Forsyth as it has been described to me in the information sheet and in discussion with Adrienne. I understand that the data collected from my participation will be used for analysis in a doctoral thesis and journal publications, and I consent for it to be used in that manner.

SignedName (please print)Date

...../...../.....



**Reliability study recruitment advertisement**

***Now recruiting:***

**Volunteers to participate in assessments of diet quality and  
physical fitness**

We are looking for volunteers to participate in three nutrition and fitness assessments. The assessments take approximately 60 minutes. They will be conducted on three consecutive days on campus, at the Northfields Clinic (Building 22) during the uni holidays. The assessments are performed one-on-one, and your results are confidential.

## APPENDIX P: PROCEDURE MANUAL

### Procedure Manual

#### Administration

##### Referrals

Receive referral (usually faxed) from GP.

Enter referral details into patient list.

Phone patient to make an appointment.

- If unable to contact patient after calling on at least three occasions, send an *Unable to contact participant* letter (see Appendix K).
- If no further contact has been made with the patient within one month from receiving the referral, send the GP an *Unable to contact patient* letter (see Appendix L).
- If the patient declines to participate, send the GP a *Patient declined to participate* letter (see Appendix L).

Send the patient an information package including an *Appointment confirmation letter* (see Appendix K), a *Participant Information Sheet* (see Appendix E), a parking permit and a campus map. Participants will be provided with an *Appointment Card* (see Appendix K) listing the date and time of each of their subsequent appointments or phone contacts at their first assessment.

##### Randomisation

Randomise participants to control and intervention groups by GP based on randomisation table.

##### Assessments

After each assessment, enter data into spreadsheet.

Enter diet history data into Foodworks (REF) and calculate the Aus-HEI score.

Write and send reports to GPs (see Appendix L) after each assessment. Write and send a report to the patient after the final assessment (see Appendix K).

##### Consultations

After each consultation, record goals into database.

Write and send a brief report to the GP (see Appendix L).

##### Attention control telephone contact

For the control group, during each phone call collect details of changes in health behaviours, appointments with health professionals, and the length of call (see Appendix J).

## **Training**

### **DEPs**

The chief investigator and both staff DEPs completed training as dietitians/exercise physiologists at the University of Wollongong in the Master of Nutrition, Dietetics and Exercise Rehabilitation. This program included training on assessment methods and counselling strategies.

A Collaborative Recovery Training Program (Oades et al., 2003) was developed at the Illawarra Institute for Mental Health. Prior to the commencement of the study, the chief investigator was trained by Dr. Trevor Crowe at the Illawarra Institute for Mental Health in the collaborative recovery training program including the transtheoretical model, motivational interviewing, and collaborative task setting and homework. The Collaborative Recovery Training Program workbook (Oades et al., 2003) was provided for further reading and reference. When each of the new DEPs commenced work on this study, they spent time reading the manual in its entirety, with particular attention to the transtheoretical model, motivational interviewing, and collaborative task setting and homework. The DEPs spent time discussing potential use in practice, and how motivational interviewing could be used during the assessments.

The following excerpt is from page 43 of the Collaborative Recovery Training Program workbook (Oades et al., 2003) that was bookmarked for regular reference:

### ***General Principals of Motivational Interviewing***

#### ***Express Empathy***

*Acceptance facilitates change.*  
*Skilful reflective listening is fundamental.*  
*Ambivalence is normal.*

#### ***Develop Discrepancy***

*Awareness of consequences is important.*  
*A discrepancy between present behaviour and important goals will motivate change.*  
*The client should present the arguments for change.*

#### ***Avoid Argumentation***

*Arguments are counterproductive.*  
*Defending breeds defensiveness.*  
*Resistance is a signal to change strategies.*  
*Labelling is unnecessary.*

#### ***Roll with Resistance***

*Momentum can be used to good advantage.*  
*Perceptions can be shifted.*

*New perspectives are invited but not imposed.  
The client is a valuable resource in finding solutions to problems.*

### ***Support Self-Efficacy***

*Belief in the possibility of change is an important motivator.  
The client is responsible for choosing and carrying out personal change.  
There is hope in the range of alternative approaches available.*

*Confrontation is a GOAL not a STYLE.*

*(Adapted from Miller & Rollnick, 1991).*

## **Students**

Student volunteers were used to conduct final assessments. The students were final year nutrition and exercise science students who had already received some training in their course on dietary and fitness assessment methods. All student volunteers attended a training session conducted by the chief investigator prior to conducting assessments. The training included demonstrations of taking a diet history, anthropometric measurements, blood pressure and fitness tests. Students were given the same instructions as are described here. Students were asked to practice these techniques with one another and were observed to be proficient by the chief investigator.

## ***Conduct of assessments and consultations***

### **Initial assessment**

Welcome the participant.  
Ask if they had any difficulty travelling to or finding the assessment location.  
Ask about how they found out about the program (GP, brochure, word of mouth, etc).  
Describe the program: lifestyle intervention, goal setting, control vs treatment group.  
Read information sheet and obtain informed consent.  
Take a medical history: physical & mental health, physical activity & weight history.  
    Do you have any medical conditions?  
    Have you been treated for any medical conditions in the past?  
    Are you taking any medication?  
    Have you previously taken any medication? What was this for?  
    Do you see (have you previously seen) any other health professionals?  
    Please describe any changes in your weight during adulthood.  
    Was the weight gain/loss intentional or unintentional?  
    How did you achieve the weight gain/loss?  
    Do you currently participate in any physical activity?  
    What activities have you participated in previously?  
Take the diet history using the following instructions:

### ***Diet History Interview Protocol***

*The purpose of the diet history is to obtain an account of a person's usual food intake. Structurally it takes the form of a description of meals consumed throughout the day, with a food frequency cross-check (Burke, 1947). One way of looking at the first component is that of a story with a beginning (usually breakfast) and the end (usually supper). Using the narrative approach to taking the history means that the participant is given the opportunity to finish his/her story first before she/he is asked any more questions. In this way the flow of the participant's information-giving is not interrupted and she/he is able to mention aspects which are seen as relevant in this context. Additional comments (not necessarily on food per se) made during this description may provide some insights for further questions or discussion later on. In introducing the diet history, reference is made to the notion of 'usual', meaning within the last couple of months, and of a **time sequence** for the description, such as the duration of the day. Participants are asked to provide a general description and then point out variations to the pattern.*

### ***Interview schedule***

- *Explain the purpose of the interview. Advise the participant that you are seeking a description of usual eating patterns and suggest she/he start with the beginning of the day.*
- *If the participant begins with the first meal of the day and uses time references or meal sequences of the day to progress with the description do not interrupt the story, merely indicate that you are listening (no, write, say "hmm" "yes").*
- *If the participant stops at intervals along the way waiting for you to respond, provide narrative support to continue e.g. "was that all for breakfast", "do you have anything after that?"*
- *If the participant responds with "it depends" be sure to encourage all possible variations on that topic (usually a meal description).*
- *If the participant says "probably" in defining amounts of foods, use visual aids to support this estimation process.*
- *If the participant goes into explanations for why/how they consume certain foods acknowledge it in a support non-judgemental way, but keep the account on track.*
- *When the participant has reached the end of the day, look at what you have noted and identify areas that you need more detail on. This will depend on the purpose for taking the history. Ask specific strategic questions.*
- *Summarise the overall pattern of the diet and ask whether there is a great deal of variation in this pattern. Note the variation.*
- *Proceed with a food frequency checklist and questions on food preparation.*
- *Ask the participant if there is anything else he/she would like to add to what she has told you and if she thinks you have a true reflection of her usual eating patterns.*

*Prepared by: Professor Linda Tapsell FDAA. Updated February 1999.*

Take blood pressure and resting heart rate using the OMRON machine. Place the cuff over the patients' right arm and press *start*. Wait until the cuff has deflated and a reading is given on the machine. Record the reading. If the reading is outside the normal range (systolic BP > 140 or diastolic BP > 90), wait five minutes and take another reading. Patients with blood pressure > 180/110 will not be permitted to participate in the fitness assessment, and will be advised to seek medical advice. For patients with large arms, use the large sized cuff. The left arm may be used if indicated for medical reasons such as right mastectomy.

Weight should be taken with no shoes and light clothing. Height should be measured with no shoes, standing straight against the stadiometer and looking straight ahead.

Waist circumference is measured at the midpoint between the iliac crest and the lowest rib. Ensure that the measuring tape is not twisted, and is level. The measurement should be taken over skin or minimal clothing, and the patient should not hold his/her breath.

The chair stand assessment should be performed with the patient sitting in an armless chair positioned against a wall. Demonstrate a chair stand (stand without using arms and keeping heels on the ground) and observe the patient to properly complete one. Using a stop watch, count how many chair stands the participant can complete in 30 seconds

The arm curl assessment is performed with a 2 kg dumbbell for women and a 3.5 kg dumbbell for men. Patients should be seated in the same armless chair positioned against a wall. Demonstrate an arm curl with elbow flexion and rotation and allow participant to briefly practice. Place the dumbbell in the patient's hand and count how many arm curls they can complete in 30 seconds timed using a stopwatch.

The YMCA step test should be performed using a 30 cm step. Set the metronome to a cadence of 96 beats per minute and demonstrate how to step to the metronome with each beat indicating one foot movement (up-up-down-down). Let the patient know that the test runs for three minutes, and that they may stop the test at any time if they feel unwell (eg. very short of breath, dizzy, faint). Time the participant for three minutes. You may speak with the patient during this time. When completed, take the heart rate manually for one minute, beginning 15-20 seconds following the end of the three minutes of stepping. When the heart rate has been taken, the patient may continue to move around the room to help to cool down.

Thank the patient for attending the assessment. Provide them with their appointment card and let them know that you look forward to seeing them next week. Allow the patient to ask any questions that they may have about today's assessment or next week's consultation.

**Initial consultation**

Greet the participant. Let them know that today's session is about finding out a little bit more about them and helping to determine some goals to work on for the following fortnight.

Use the initial consultation form to guide the interview. The principals of motivational interviewing should be used during this interview. The aims of this interview are to determine the patient's usual activities, their (perceived) level of control over their food and physical activity choices, and potential barriers to making lifestyle changes. Looking at their personal nutrition and physical activity goals will assist to develop tasks for homework. Homework tasks must be documents on the homework sheet and include a description of the task, relevant goal, day, time, duration, location and frequency. Participants are asked to complete a confidence rating of 0-100. If a patient gives a confidence rating of less than 70, the task should be re-evaluated with particular attention to importance and barriers.

**Review consultations**

At the review consultations, any changes are documented, and the homework from the previous session is evaluated. Patients rate their success in terms of how much and how well they have done their homework, and how difficult they found it was to complete. These ratings provide starting points for discussion around how to adjust the task or address barriers for the following fortnight. Depending on their previous success, patients may choose to continue with or abandon their initial task, develop tasks that are more or less challenging, and may add additional tasks. For example, a participant who was successful in walking 20 minutes twice a week may aim to walk for 20 minutes three times per week, and eat one additional piece of fruit daily.

**Final assessment**

This assessment is conducted in the same manner as the initial consultation except that informed consent has already been provided. Wherever possible, the final assessment should be conducted by an alternative DEP to that whom provided the consultations for the patient.



## APPENDIX Q: PUBLICATIONS ARISING FROM THIS THESIS

### Conference abstract: Nutrition and mental illness

#### Food nutrition in health and disease

##### NUTRITION AND MENTAL ILLNESS

ADRIENNE FORSYTH<sup>1</sup>, PETER WILLIAMS<sup>2</sup>, FRANK DEANE<sup>1</sup>

<sup>1</sup>Illawarra Institute for Mental Health, University of Wollongong, Wollongong NSW 2522 Australia

<sup>2</sup>Smart Foods Centre, University of Wollongong, Wollongong NSW 2522 Australia

Many in-patients and out-patients accessing dietetics services present with primary or comorbid mental illness. However, standard medical nutrition therapy for mental illness does not exist. This review seeks to establish evidence for best practice with patients with mental illness. A search of electronic databases (Cochrane, Medline, ScienceDirect and Web of Science) from 1966 to 2005 was conducted using the search terms nutrition, nutrient, diet, mental health, mental illness, depression, depressive symptoms, anxiety, substance misuse, substance abuse, drug abuse and alcohol abuse. All eligible studies were reviewed. A total of 32 publications were found (3 case reports; 14 reviews; 5 controlled trials; 7 reports of survey and observational data; 3 models and opinions). Support for the use of nutrition intervention in the treatment of mental illness is based in large part on case study evidence, with limited support from larger studies of diet-disease relationships. There is limited support for the role of medical nutrition therapy for mental illness; key nutrients have been identified for consideration including iron, folate and omega-3 fatty acids. Further investigation is required before evidence-based practice recommendations can be developed.

Funding source: National Health and Medical Research Council

##### ARE CHILDREN AND ADOLESCENTS OF MOTHERS WITH GESTATIONAL DIABETES AT INCREASED RISK OF OBESITY? A REVIEW

MELINDA MORRISON<sup>1</sup>, CLARE COLLINS<sup>2</sup>

<sup>1</sup>Diabetes Australia-NSW, Sydney, New South Wales 2001 Australia

<sup>2</sup>School of Health Sciences, University of Newcastle, New South Wales 2308 Australia

While lifestyle related risk factors for the development of childhood obesity have been established, the role of intrauterine factors including maternal gestational diabetes mellitus (GDM) in the aetiology of childhood obesity is less clear. The purpose of this literature review was to evaluate the evidence relating maternal GDM to risk of offspring obesity. Medline, Cinahl and Cochrane electronic databases were searched from 1990–2005 using a combined keyword search strategy. Six studies specifically examining childhood obesity in offspring of women with GDM were identified (one epidemiological, four prospective and one retrospective cohort). Methodological quality was assessed, however due to the small number of studies, all were included for review and their limitations discussed. GDM was positively associated with the risk of offspring obesity in four of the reviewed studies. However multivariate analysis indicated that GDM was not an independent risk factor for offspring obesity with maternal body mass index (BMI), paternal BMI and birth weight attenuating risk. While these studies suggest that GDM may be a risk marker for the development of offspring obesity, its role as a causal factor has not been established. Differences in GDM diagnostic criteria, maternal glucose control and critical time periods for assessing childhood obesity also limit the interpretation of these findings. Further studies are required to determine the strength of this association; in particular the role of maternal BMI and shared familial

lifestyle patterns that may play a role in the development of obesity in this population.

Funding source: DAA Unilever Postgraduate Research Scholarship

##### PRACTITIONER CONSENSUS ABOUT THE EFFECTIVENESS OF LEGISLATIVE AND ECONOMIC STRATEGIES FOR OBESITY PREVENTION

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<sup>1</sup>School of Public Health, Griffith University, Gold Coast, Queensland, 4217, Australia

There is now near universal recognition amongst health organisations and many governments worldwide that the associated health and economic burden of obesity is increasing and threatens to compromise public health globally. In response numerous countries have, or are in the process of, developing strategies and action plans to address this public health problem. Because government generated obesity prevention plans are developed in the context political imperatives, there has been limited consideration and analysis of politically and socially unacceptable (unpopular) strategy options for obesity prevention. This study aimed to assess consensus about the effectiveness of unpopular strategies based on legislative and economic strategies, amongst practitioners involved in, and knowledgeable of, obesity prevention. This paper reports on the first two rounds of a Delphi study conducted amongst a panel of 20 Australian based obesity prevention practitioners. This technique involved a first round survey including a summary of the literature with questions imbedded in the discussion. Once completed these were returned via email for analysis. Round two surveys included a summary of the panel feedback with further questions building on round 1. There is strong consensus that regulatory strategies that support nutrition and physical activity promotion are, or would be, effective if implemented. Similarly strong consensus exists that these strategies are inevitable strategy pre-requisites for effective obesity prevention in the Australian context.

Funding source: Griffith University New Research Grants Program

##### TEAM TEACHING IN CLINICAL DIETETICS – STUDENT FEEDBACK AND STUDENT OUTCOMES

ELEANOR BECK<sup>1</sup>, TANYA HAZLEWOOD<sup>2</sup>, ROBYN MACDONALD<sup>2</sup>, NAOMI CROCKETT<sup>3</sup>

<sup>1</sup>Department of Biomedical Science, University of Wollongong, NSW 2522

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Limited opportunities for student placements in clinical dietetics have necessitated a review of placement procedures for universities. The aim of this research was to evaluate the effectiveness of a team teaching model for clinical dietetic student training. Thirty-four final year dietetic students were placed in teams of 2 (4 students) or 3 (30 students) with a single supervisor, for their first clinical placement. Student satisfaction with team teaching was measured using a survey requiring responses relating to team process, advantages, disadvantages, per-



## Conference abstract: Baseline characteristics of primary care patients with depression and/or anxiety participating in a lifestyle intervention

### EVALUATION OF A PORTABLE, HAND-HELD CALORIMETER FOR MEASUREMENT OF RESTING ENERGY EXPENDITURE IN A SAMPLE OF HEALTHY OLDER AUSTRALIANS

SAMIRA FARES<sup>1</sup>, MICHELLE MILLER<sup>1,2</sup>, STACEY MASTERS<sup>1</sup>, MARIA CROTTY<sup>2</sup>

<sup>1</sup>Flinders Centre for Clinical Change and Health Care Research, Adelaide, SA 5001 Australia

<sup>2</sup>Flinders University, Adelaide, SA 5001 Australia

Resting energy expenditure contributes 60–80% of total energy expenditure and accurate estimates are required for appropriate nutrition counselling. The recent development of a portable, inexpensive calorimeter may allow for accurate measurement of resting energy expenditure but little is known about its validity and acceptability amongst healthy older Australians. The aim of this cross-sectional study was to assess the validity and acceptability of a hand-held calorimeter for measurement of resting energy expenditure in a sample of healthy older Australians. Assessment of resting energy expenditure was performed under fasting conditions using the GEM (traditional calorimeter, NutrEn Technology) and the MedGem (hand-held calorimeter, HealtheTech). Bias (difference between two methods) and limits of agreement ( $1.96 \times \text{SD}$ ) were calculated to determine the level of agreement between the two measurements. An 8 item self-administered survey was used to determine the patient acceptability of the two measurement devices and the Wilcoxon Signed Ranks Test used to test for significant differences. Mean (SD) resting energy expenditure of the 48 participants (mean age 80 years, mean BMI  $23 \text{ kg/m}^2$ ) was  $4788 (783) \text{ kJ}$  and  $6255 (1491) \text{ kJ}$  for the traditional and hand-held calorimeter respectively, paired  $t$ -test  $P < 0.001$ . Mean bias and limits of agreement were  $1467 (-1136, 4070) \text{ kJ}$ . The hand-held calorimeter was less comfortable than the traditional indirect calorimeter. The hand-held calorimeter is not acceptable for use at either the individual or group level given a mean overestimate of  $1500 \text{ kJ/day}$ , the wide limits of agreement and the discomfort experienced by the participants. Further research is indicated before the hand-held calorimeter should be used in an ageing population.

**Funding source:** Supported by an NHMRC Equipment Grant.

### A DIETITIAN IN FOOD INDUSTRY

HEATHER FERGUSON

HJ Heing Company, Southbank VIC 3006 Australia

The role of food and nutrition in health has never been higher profile than now. Our population is seeking healthier foods but demanding convenience and contrarily, indulgence. The foods available in the food supply are critical to health and the food industry, from paddock to plate, is the key to our food supply. The processed food and beverage industry is Australia's largest manufacturing industry with a turnover of \$55 Billion in 2000/2001 (ABS, Manufacturing Industry, Cat No.8201.0). Supermarkets and grocery stores make up around 66% of food sales. Despite this, less than 5% of dietitians in Australia are employed in the food industry. Food product development is carried out by the marketing and food technology areas and requires meeting a range of challenging criteria for product launch. Nutrition is not necessarily the highest priority, and most often not the area of expertise of those doing this work. Nutrition expertise and influence in the food chain can have a major impact on product development and marketing communication about foods. Thus a dietitian in this role can have great influence on what our population can choose to eat, and ultimately on better population health. For a dietitian to work in this challenging role, an understanding of the commercial environment and a sound understanding of food science and technology are required.

### DIETARY FACTORS CONTRIBUTING TO WEIGHT GAIN OVER 10 YEARS AMONG OLDER AUSTRALIANS

VICTORIA FLOOD, GEORGE BURLUTSKY, KAREN WEBB, TIM GILL, PAUL MITCHELL

University of Sydney, Sydney, NSW 2006 Australia

Weight gain in adult years increases the risk of cardiovascular disease and type 2 diabetes. The aim of this study was to examine associations between baseline dietary intake and weight gain over 10 years among a cohort of older Australians. The Blue Mountains Eye Study is a population-based cohort of older Australians in two postcode areas west of Sydney. At baseline (1992–94) 3654 people aged 49 years+ were examined; 5 years later 2334 people were re-examined, and 10 years later 1952 people were re-examined (75% of survivors). Measures collected included weight, height and a 145 item food frequency questionnaire (FFQ). During the ten year period, 1166 people completed the FFQ satisfactorily on all three occasions. Mean intakes of foods and nutrients were examined in relation to weight gain. At baseline, 57.9% of participants were overweight or obese and 10 years later 65.9% were overweight or obese, with a median weight gain of 2.4 kg. People in the highest tertile of consumption of biscuits and cakes at baseline were more likely to have gained weight  $>2 \text{ kg}$  compared to those in the lowest tertile; significant among those aged 65+ years at baseline (Odds Ratio (OR) 1.67; 95% confidence interval, CI, 1.04–2.68,  $p = 0.033$  in 65+ years; OR in  $<65$  years 1.14, CI 0.79–1.65,  $p = 0.31$ ), after multivariable adjustment. Other food groups investigated but not significantly associated with weight change included vegetables and fruit, breads and cereals, dairy products, meat, fish, fats and oils, confectionary and beverages (non-alcoholic and alcoholic). In this preliminary analysis, a higher intake of biscuits and cakes was associated with weight gain greater than 2 kg during 10 years of follow-up.

**Funding source:** National Health and Medical Research Council, Meat and Livestock Australia.

### BASELINE CHARACTERISTICS OF PRIMARY CARE PATIENTS WITH DEPRESSION AND/OR ANXIETY PARTICIPATING IN A LIFESTYLE INTERVENTION

ADRIENNE FORSYTH, PETER WILLIAMS, FRANK DEANE, OWEN CURTIS

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There is considerable evidence to support a role for both diet and exercise in the management of mental illness including depression and anxiety. A pilot study was conducted to assess the feasibility of providing diet and exercise counselling in a primary care setting. The aim of the present study was to describe baseline characteristics of patients referred by general practitioners (GPs) to participate in the study. Eighteen patients attended an initial assessment conducted by a dietitian and exercise physiologist. Characteristics assessed included mental health, fitness, physical activity and nutrient intakes. Patients were referred with moderate levels of depression (mean 10.4/21, range 2–20), anxiety (mean 7.2/21, range 1–14) and stress (mean 9.4/21, range 4–19) as measured using DASS-21 (Depression, Anxiety and Stress Scale). Results of the three-minute YMCA stepping test indicated below average or poorer aerobic fitness for two thirds of participants. Only two participants met the National Physical Activity Guidelines recommendations for physical activity. Nutrient intakes were assessed using a diet history interview and computer nutrient analysis. Nutrients most commonly underconsumed by participants included calcium



## Conference abstract: A model of care for diet and exercise counselling for patients with depression and/or anxiety in primary care

[50% not meeting the estimated average requirement (EAR)], potassium (39% not meeting the adequate intake), magnesium (28% not meeting the EAR), and folate (28% not meeting the EAR); however, this group consumed higher levels of all nutrients except vitamin A and vitamin C when compared to population intakes reported in the 1995 National Nutrition Survey. GPs referred patients with moderate levels of depression, anxiety and stress that scored poorly on indicators of fitness, physical activity and nutrient intakes.

**Funding sources:** National Health and Medical Research Council, Illawarra Division of General Practice.

### A MODEL OF CARE FOR DIET AND EXERCISE COUNSELLING FOR PATIENTS WITH DEPRESSION AND/OR ANXIETY IN PRIMARY CARE

ADRIENNE FORSYTH, PETER WILLIAMS, FRANK DEANE, OWEN CURTIS

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There is considerable evidence to support a role for both diet and exercise in the management of mental illness including depression and anxiety. A pilot study was conducted to assess the feasibility of providing diet and exercise counselling in a primary care setting. General practitioners (GPs) within the Illawarra Division of General Practice were invited to refer patients to participate in the study. The program was designed to be sustainable using the Medicare Plus Enhanced Primary Care (EPC) scheme, and involved individual sessions with a dually qualified accredited practising dietitian and accredited exercise physiologist. The content of the program was flexible and utilized motivational interviewing to promote behaviour change amongst participants. All diet and exercise advice was individually tailored and provided according to goals developed with the participant. Overall, the program included six sessions: an assessment, four consultations, and a final assessment for research purposes that could be dropped to align with the five visits provided in the EPC scheme. Following the pilot study, several changes were made to the program design to improve patient outcomes. Patients were seen more frequently to enhance the patient-practitioner relationship and reduce patient anxiety. Alternative strategies for communication including mobile phones, text messaging, electronic mail and traditional mail improved communication with patients. Overall, these changes have contributed to a reduction in missed appointments from 50% to virtually none, and in dropouts from 61% in the pilot to 10% in the main study.

**Funding sources:** National Health and Medical Research Council, Illawarra Division of General Practice.

### HEALTHY EATING SCHOOLS PROGRAM EVALUATION

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<sup>1</sup>Monash University, Clayton, VIC 3168 Australia

<sup>2</sup>Nutrition Australia (Victoria Division), Melbourne, VIC 3000 Australia

In 2004, Nutrition Australia (Victoria), launched the Healthy Eating Schools (HES) Program, with the aim of improving the eating habits of Victorian primary school children. Consistent with the WHO Health Promoting Schools model, HES seeks to influence all sectors of the school environment. The impact of the HES Program on the development of nutrition policies and initiatives within schools was evaluated in 48 primary schools located across metropolitan, regional and rural Victoria. Documentation submitted by schools was collated to

determine the types of activities undertaken since initiation of the program. 38 schools achieved HES accreditation. A variety of healthy eating initiatives were employed across all sectors of school environments. 93% formed a nutrition committee and developed a healthy eating action plan/policy. All schools had incorporated nutrition initiatives into the curriculum, 75% ran nutrition-related professional development sessions, 96% had a water/hydration initiative and 91% had implemented daily fruit and vegetable breaks. Of the schools with a canteen service, 89% had made menu changes. The results reflect the success of the program in reaching all aspects of the school community, which has prompted the creation of an environment supportive of healthy eating and an increased knowledge and awareness of nutrition issues. However, conclusions that can be drawn at this stage are limited due to the lack of baseline data, meaning any evidence of behaviour change can only be described anecdotally.

### CLASSIFYING PRIORITY FOR INPATIENT MANAGEMENT BY DIETITIANS

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Appropriate dietetic workload management during busy periods or in times of limited staff availability is essential for effective nutritional care of hospital patients in a busy acute care hospital. Improving effective discharge and emergency department performance targets are a priority for service delivery at Southern Health, a provider of a broad range of health care services throughout the south eastern suburbs of Melbourne. A 'Clinical Prioritisation Tool' was developed through a collaborative team process by the Department of Nutrition and Dietetics at Dandenong Hospital to ensure all patients who are referred for dietetic services receive consultation in a timely manner, whilst contributing to hospital performance targets. The criteria for this tool have been developed around referral type and referral source. The tool consists of a numbered sequence to classify these criteria with the highest priority rating being for patients waiting imminent discharge or to prevent a hospital admission. The tool ensures those in most need of service are identified easily and there is a consistent understanding of service prioritisation amongst staff. The tool is also used as a teaching aid for new staff and students on clinical placement. When staffing resources are limited, the tool is used as a guide for staff to manage workload pressures and ensure a consistent service delivery is provided. The dietitians have found the tool easy to use and believe it has enhanced the efficiency of their work.

### IMPROVING EARLY REFERRAL TO ALLIED HEALTH USING THE ALLIED HEALTH TRIGGER TOOL

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Early referral to Allied Health (AH) is essential to timely and appropriate management of the acute hospital patient. The Clinical Review Process in conjunction with the Southern Health Quality and Risk Management Program at Southern Health, tracks the patient journey, and identifies care management problems. This results in the development of recommendations for improved patient care. Several patient cases identified the need for earlier intervention of AH professionals. In order to facilitate early interdisciplinary AH referral, evidence based AH referral triggers were identified by Physiotherapy, Occupational

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