Motivation, psychological distress and exercise adherence following myocardial infarction

Mary Angela Ljubic
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MOTIVATION, PSYCHOLOGICAL DISTRESS AND EXERCISE ADHERENCE
FOLLOWING MYOCARDIAL INFARCTION

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

MASTER OF SCIENCE (HONOURS)

From

UNIVERSITY OF WOLLONGONG

by

Mary Angela Ljubic
BA, MSc

Department of Psychology

2001
I, Mary Angela Ljubic, declare that this thesis, submitted in partial fulfillment of the requirements for the award of Master of Science (Honours), in the Department of Psychology, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Mary Angela Ljubic

19 March 2001
Abstract

Patient adherence to post coronary exercise therapy is relatively poor with at least 50% discontinuing within 6 to 12 months of starting their cardiac rehabilitation programme (Dishman, 1988; Oldridge, 1988). The relationship between exercise motivation, psychological distress and adherence to exercise therapy following myocardial infarction (MI) was examined. The extent to which myocardial infarction patients adhered to their cardiac rehabilitation programme was also explored. Researchers have found that the factors that influence participation in cardiac rehabilitation include intrinsic motivation, extrinsic motivation and psychological distress (Blumenthal, Williams, Wallace, Williams, & Needles, 1982; Oman & McAuley, 1991; Mullan, Markland & Ingledew 1997). Fifty myocardial infarction patients were recruited from the Cardiac Education and Assessment Programme (CEAP) at Westmead Hospital. Demographic information, the Exercise Motivation Inventory-2 (EMI-2) and the Depression, Anxiety and Stress Scale (DASS) were administered prior to the programme. The DASS and EMI-2 were re-administered by telephone interview at 5 month follow-up. Four exercise adherence measures were included in the present study: attendance, exercise stress test, self-report ratings and 7 day activity recall interview. There was a 46% adherence rate for MI patients during the hospital programme. Of those individuals who completed CEAP, 91% obtained functional improvement on the exercise stress test. For the 38 patients who were followed-up by telephone interview at 5 months, 71% were exercising according to CEAP prescription. Results indicated that multiple measures of exercise
adherence provided a more comprehensive picture. The results did not support
the utility of Cognitive Evaluation Theory in explaining the links between intrinsic
and extrinsic motivation and adherence to exercise therapy. However, higher
levels of anxiety were associated with lower levels of self reported exercise
adherence. The three strongest motivations for exercise in this group of MI
patients were all health related; wanting to be free from illness, maintaining good
health and recovering from the effects of coronary heart disease.

Recommendations for programme development are presented. It is also
suggested that there is a need to generate guidelines for measuring exercise
adherence and these need to be empirically driven.
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Lastly, I would like to thank all the patients who gave their time into completing the survey package and interviews.

"Success like happiness cannot be pursued, it must ensue as the unintended side-effect of a personal dedication to a course greater than one’s self" by Victor Frankl.
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Chapter 1: Introduction

1.1 Literature Review Exercise Motivation

Thirty-three percent of Australians are classified as being sedentary while only approximately 20% are involved in regular exercise (Bauman, Owen, & Rushworth, 1990). Biddle and Smith (1991) argue that “exercise is a complex behavioral process involving adoption, maintenance, dropout and resumption” (p. 39). One of the most commonly reported reasons for poor adherence to exercise programmes is the lack of motivation (Klinger, 1984; Oldridge, Wicks, Hanley, Sutton, & Jones, 1978; Sluijs & Knibbe, 1991). Ice (1985) aptly stated that:

Inherent in the concept of compliance to exercise is the factor of motivation. Thirty-four of 41 studies conducted in the last 20 years that have included motivation as an independent variable have found it to be a significant factor influencing compliance (p. 1835).

Motivation has been defined as individuals’ drive, desire, commitment and persistence to undertake a task (Singer, 1984). Motivation can be viewed as a complex generic term which incorporates personality, social factors and cognitive processes (Roberts, 1992; Granlund, Bruin, Johansson, & Sojka, 1998). In particular, exercise motivation may be defined as the combination of underlying processes that initiate, direct and maintain physical activity (Frederick & Ryan, 1995).
It is necessary to understand the underlying processes of exercise motivation to identify the factors that predict adherence so that cardiac rehabilitation (CR) practitioners are aware of the factors when developing treatment programmes and to reduce discontinuation from treatment. Also, understanding the process of exercise motivation should help practitioners to encourage coronary patients who are required to make more than one lifestyle change during treatment. Numerous factors have been suggested as possible indicators of exercise motivation. These include intrinsic motivation, extrinsic motivation, self-motivation, wellness motivation, self efficacy, locus of control, competence, and self determination (e.g., Fluery, 1991; Garcia & King, 1991; Granlund, Brulin, Johansson & Sojka, 1998; Markland & Hardy, 1993; Mullan, Markland & Ingledew, 1997; Oman & McAuley, 1993; Wankel 1993).

In earlier studies, exercise motivation was examined and reported in an atheoretical or descriptive manner and focused on the reasons adults participate in exercise (Biddle, 1995). In more recent studies, various theories have been used to explain the role of motivation and its relationship to exercise adherence (e.g. Stages of Change, Organismic Integration Theory, Cognitive Evaluation Theory). For example, in one study, the Cognitive Evaluation theory construct of intrinsic motivation was tested as a predictor of exercise participation in a community aerobic fitness programme using a pre and post test design (Oman & McAuley, 1993). Exercise motives were assessed using the Intrinsic Motivation Inventory (IMI) and adherence was measured using attendance information kept at the Community Centre. Oman and McAuley (1993) found that there was a significant association between attendance and intrinsic motivation. It appears that there is very little research and theoretical
development into the link between intrinsic, extrinsic motivation and exercise adherence within cardiac rehabilitation programmes in Australia.

1.1.1 Reasons Healthy Individuals Exercise

Exercise motivation also appears to be influenced by the type of physical activity (e.g. sport, community fitness programmes, exercise specific for clinical groups) age range, (e.g. children, young adults, adults, older adults) and gender. For example, researchers found that the main reasons older women exercised was to maintain or improve fitness as well as enjoyment of exercise and social considerations (Kirkby, Kolt, Habel & Adams, 1999). The least important reasons were wanting to be noticed, to be popular and to feel important. Older women (75+) placed more importance upon the social motives and less on personal fulfillment motives than did the younger groups. In another study researchers found that the reasons male high school students exercised was due to competition, social recognition and fitness motives (Tappe, Ernwald & Duda, 1988 cited in Duda, 1989). In the same study female students rated weight management motives as important goals for exercising while both male and female high school students rated health motives as the least important reasons for exercising. Frederick and Ryan (1993) found that individuals who played sport were more likely to be motivated by interest/enjoyment and competence than were fitness participants. In the same study, fitness participants however, were more likely to be motivated by body related incentives. In addition, other researchers have suggested that adults enter structured exercise programmes due to fitness and health (Davis, Fox, Brewer & Ratusny, 1995; Dishman, 1987; Morgan, Shephard & Finucane, 1984). It appears that there has been an emphasis on examining the reasons healthy
groups of individuals exercise and very little research about the exercise motivations for clinical samples such as MI patients.

1.1.2 Reasons MI patients enter Cardiac Rehabilitation

In exercise motivation research, Cognitive Evaluation theory was mainly tested in controlled studies with the use children (Deci & Ryan, 1985) and also with young athletes (Ryan, Vallerand & Deci, 1984). There appear to be limited number of studies which examine exercise motivation for MI patients. To date, researchers have found that MI patients enter cardiac rehabilitation programmes due to their doctors recommendation and to prevent another heart attack (Ades et al., 1992). In another study researchers examined the relationship between wellness motivation, social support, health locus of control and health value orientations for MI patients undergoing a CR treatment programme in the USA (Fluery, 1991). Using the Self Motivation Inventory (SMI) to measure wellness motivation, Fluery (1991) found that there was a positive relationship between health locus of control, health value orientation and wellness motivation. Fluery (1991) defined wellness motivation as “the individual intention to initiate and sustain health behaviour” (p. 3). In the Fluery (1991) study, it appears that there were no theoretical justifications for using the constructs of wellness motivation, health locus of control and health value orientation. Also, it appears that the operational construct of wellness motivation and self-motivation were used interchangeably. The main focus for researchers in motivation and adherence research has been to explore the concept of self-motivation.
1.1.3 Motivation and its Relationship to Adherence

Researchers have used the concept of self-motivation to examine adherence to treatment such as CR programmes. For example, Dishman and Gettman (1980) defined self-motivation as “a generalised, nonspecific tendency to persist in a habitual behavior regardless of extrinsic reinforcement and independent of situational influence” (p 2897). Using the Self-Motivation Inventory (SMI), Dishman and Gettman (1980) found that coronary patients who adhered to a CR programme were more self-motivated than those who did not adhere to the programme. This finding is consistent with another study that found low levels of self-motivation in coronary patients predicted low levels of exercise adherence to CR programmes (Snyder, Franklin, Foss & Rubenfire, 1982). In a similar study, researchers examined self-motivation and adherence to an exercise programme that was designed for individuals with back pain (Granlund, Brulin, Johansson & Sojka, 1998). They found that individuals who adhered to the programme were likely to exercise because they believed that inactivity would be harmful for their back pain.

1.1.4 Theories of motivation

No one model or theory has been developed that comprehensively explains exercise motivation (Hellman, 1997). However, there are a number of theories which attempt to describe the process of exercise motivation (Roberts, 1992). In earlier studies, individuals were viewed in a mechanistic manner (e.g. behaviourist theory), in terms of personality (e.g., achievement motivation theory), in terms of drives (e.g. Maslow’s hierarchy of needs theory) and according to a life span approach (Biddle, 1995). In recent studies social cognitive and organismic theories have been used to explain motivation as they
encompass the interactions of cognitive, social and environmental influences on behaviour (e.g. self efficacy and attribution theories). The social cognitive and organismic frameworks acknowledge that individuals have volition and are able to initiate behaviours through their interpretation of events. Social cognitive theory postulates that cognitive processes, social and environmental influences mediate behaviours.

For the purpose of this study, Cognitive Evaluation Theory (Deci & Ryan, 1985) will be discussed as it provides an explanation for the relationship between exercise motivation and the adherence process. According to Deci and Ryan (1985) Cognitive Evaluation Theory describes the individual as an organism who is active, volitional and directs behaviour. One of the fundamental tenants of CET are the beliefs that individuals are competent and self determining (Deci & Ryan, 1985). Behaviour is driven by the multidimensional processes of intrinsic and extrinsic motivation.

1.1.5 Intrinsic Motivation

Deci and Ryan (1985) suggest that intrinsic motivation is about an individual’s need to feel that they are able to control their fate and to have choice, competence and self determination. Emotions such as enjoyment and excitement follow the experiences of competence and autonomy and represent the outcomes of intrinsic motivation (Deci & Ryan, 1985). Competence is developed by successful mastery experiences such as learning to swim or ride a bicycle. Intrinsic motivation refers to innate and spontaneous tendencies to do tasks voluntarily because of the sheer enjoyment, fun, curiosity and personal mastery. The rewards for these activities are inherent and they are motivated by the satisfaction experienced in doing the activity. For example, adults who
play noncompetitive golf may be intrinsically motivated and continue this sport for the pleasure and not for any material reward or external reason.

1.1.6 Extrinsic Motivation

Extrinsic motivation refers to doing a particular activity for external reasons such as material rewards, trophies, pleasing significant others, body related concerns, social status and achieving financial success (Kasser & Ryan, 1996; Weiss & Chaumeton, 1992). The extrinsically motivated individual engages in an activity for a reason other than inherent interest. Extrinsic reasons are related to pressure, control and an external locus of causality. According to CET, extrinsic motivation is related to the eventual discontinuation of physical activity.

1.1.7 Cognitive Evaluation Theory

The CET proposes that intrinsic motivation may be enhanced by affecting the individuals’ perception of competence and feelings of self-determination (Deci & Ryan, 1985). The theory indicates that every event is influenced by structures, rewards and communications which have two functional aspects, an informational aspect either/or a controlling aspect.

Informational aspects refer to the provision of relevant information in order to facilitate competence. These informational aspects may be either positive which increases competence or negative which imply incompetence. Controlling aspects relate to individuals’ experience of self-determination. For example, when an event is perceived to be highly controlled, there is a low level of self-determination and external locus of causality. On the other hand when an event is low in levels of control individuals tend to experience a sense of choice and autonomy.
For example, when MI patients enter a cardiac rehabilitation programme they rarely initiate the exercise programme due to interest/enjoyment as exercise therapy may make unpleasant physical demands on their bodies (McAuley et al., 1991). The main reasons these patients enter the CR programme is due to the health care professionals' advice (Ades et al., 1992). It appears that in general MI patients would be likely to be more extrinsically motivated than intrinsically motivated at the beginning of treatment. Generally MI patients are supervised within the CR programme and in most cases the treatment programme is imposed upon the patient resulting in feelings of being controlled by health care professionals. According to CET, MI patients may experience decreased levels of interest or intrinsic motivation when there is a high level of external control. Conversely, if MI patients perceive an event to have high levels of autonomy and internal locus of control then intrinsic motivation should increase. For example, once the hospital CR programme is completed the MI patients are not supervised but are free to do the exercise in their own time which should result in higher levels of intrinsic motivation.

According to CET when patients feel that they have a major role in programme development and they feel that they are responsible for their recovery, intrinsic motivation may be increased and they are more likely to maintain physical activity over time. On the other hand individuals who exercise on the advice of the health care professional may be extrinsically motivated and over time discontinue their programme at home even if this is contraindicated for recovery.

According to CET, intrinsic motivation can be enhanced or undermined by the informational and functional aspects (Deci & Ryan, 1985). That is, when
individuals feel that they have all the available information, they are able to make appropriate choices and enhance their intrinsic motivation. On the other hand, control from an external source causes tension and pressure which in turn undermines intrinsic motivation (Deci & Ryan, 1985). For example, intrinsic motivation may be enhanced by informational aspects or the health care professional providing positive feedback when MI patients increase their fitness goals. Conversely, if the health care professional or a significant other adopt a communication style which is characterised by criticism and put-downs, the negative information may lower the MI patients feelings of competence and they may not want to continue their CR programme.

Functional significance appears to be one of the important aspects of CET (Deci & Ryan, 1985). Many events have either controlling and informational elements so that they are likely to affect the individual's locus of causality, perceived competence and intrinsic motivation. However, the most important aspect of the event will determine whether the locus of causality will be seen as being internal or external. It will also determine whether competence will be high or low and thus whether intrinsic/extrinsic motivation will be primed. Deci and Ryan (1985) argue that choice and positive feedback influence the importance of the informational aspect while rewards, time deadlines and supervision result in the controlling aspect as being more important.

The following example provides a description of one of the possible sets of interactions which could occur in relation to exercise adherence and motivation during cardiac rehabilitation. An individual who has a heart attack (the event) may decide to enter a CR programme and start exercising due to
fears about dying or because their partner will get upset if the exercise programme is not followed (extrinsic focus). Once the exercise programme is started the MI patient may receive positive feedback from the medical staff and increased fitness which should develop into increased feelings of competence and self worth (intrinsic motivation). Despite the encouragement, the MI patient irregularly attends the hospital programme and shows lack of persistence and little interest in doing the exercise at home. The health care professionals may learn that the MI patient is being criticised by his/her spouse for spending time away from the family and there is considerable pressure from the medical practitioner to lose weight and get fit. It appears that according to CET principles, the MI patient perceived the controlling aspect as being more important, which resulted in an extrinsic focus which undermined the patients intrinsic motivation.

1.1.8 Measures of Intrinsic and Extrinsic Motivation

It appears that there are gaps between the theory description of intrinsic and extrinsic motivation and the measurement of these constructs. This is in part influenced by varying operational definitions within the theoretical frameworks. For example, some researchers argue that intrinsic motivation refers to enjoyment, interest and competence (Frederick & Ryan, 1993) while others refer to intrinsic motivation as the ability to know, to accomplish things and to experience stimulation (Pelletier, Tuson, Fortier, Vallerand, Briere & Blas, 1995). Some researchers define exercise motivation in broad terms such as physical, psychological and social and do not make distinctions between intrinsic and extrinsic motivation (See Table 1.1, Stenstrom et al., 1997).
There appear to be inconsistencies in the way researchers have measured intrinsic and extrinsic motivation. For example, in the original development of the Exercise Motivation Inventory, researchers argued that intrinsic motivation referred to intrinsic motivation as enjoyment, challenge, affiliation and skill improvement while extrinsic motives were appearance, weight management and social recognition (Markland & Ingledew, 1997). In another study, intrinsic motivation was classified as enjoyment and revitalization while appearance and weight management represented extrinsic motivation (Ingledew, Markland & Medley, 1998). However, for the purpose of the present study the definition of intrinsic and extrinsic motivation was consistent with the definition provided by Markland and Hardy (1993) for the Exercise Motivation Inventory-2 (EMI-2) and according to Cognitive Evaluation Theory principles. The EMI-2 captures broad ranges of exercise motives. Also, it can be used to classify specific subscales into intrinsic or extrinsic (See Table 1.1).

Several researchers have found that enjoyment is a fundamental reason for participation in physical activity and some researchers consider it to be intrinsic (Boothby, Tungatt & Townsen 1981; Perin, 1979; Wankel, 1985; Deci & Ryan, 1985; Singer, 1984; Wankel, 1988). The enjoyment subscale is about feeling good while exercising, having interest in exercise for the inherent satisfaction.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Name of Scale</th>
<th>Intrinsic Motivation</th>
<th>Extrinsic Motivation</th>
<th>Other Exercise Motivations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davis et al., (1995)</td>
<td>Reasons for Exercise Inventory (REI)</td>
<td>Interest, enjoyment, competence (skill development, competition, challenge)</td>
<td>Body related concerns, fitness appearance</td>
<td>Weight control, attractiveness, tone, fitness, health, mood &amp; enjoyment</td>
</tr>
<tr>
<td>Frederick &amp; Ryan (1993)</td>
<td>Motivation for Physical activities Measure (MPAM)</td>
<td>Enjoyment revitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingledew, Markland &amp; Medley (1998)</td>
<td>Exercise Motivation Inventory-2 (EMI-2)</td>
<td>Enjoyment</td>
<td>Appearance</td>
<td></td>
</tr>
<tr>
<td>Kasser &amp; Ryan (1996)</td>
<td>Aspiration Index (AI)</td>
<td>Affiliation, community feeling, physical fitness, self acceptance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markland &amp; Ingledew (1997)</td>
<td>Exercise Motivation Inventory-2 (EMI-2)</td>
<td>Enjoyment</td>
<td></td>
<td>Social recognition stress management competition, positive health nimbleness, strength</td>
</tr>
<tr>
<td>Mullan, Markland &amp; Ingledew (1997)</td>
<td>Behavioral Regulation in Exercise Questionnaire (BREQ)</td>
<td>Intrinsic regulation, enjoyment, satisfaction, pleasure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oman &amp; McAuley (1993)</td>
<td>Intrinsic Motivation Inventory (IMI)</td>
<td>Perceived competence, effort-importance, interest/enjoyment, pressure-tension, perceived choice</td>
<td></td>
<td>Identified benefits</td>
</tr>
<tr>
<td>Pelletier et al., (1995)</td>
<td>Sport Motivation Scale (SMS)</td>
<td>To know, to experience stimulation, to accomplish things</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenstrom et al (1997)</td>
<td>Exercise Motivation Index (EMI)</td>
<td>Perceived competence, effort-importance, interest/enjoyment, pressure-tension, perceived choice</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lack of enjoyment has been found to influence the discontinuation from activity (Markland & Hardy, 1993). According to CET the enjoyment/interest in an activity drives the individual's behaviour. Both revitalisation and challenge are regarded as intrinsic according to the EMI-2. Revitalisation refers to feeling energized by exercise. Challenge refers to setting goals, personal exercise challenges and comparing exercise ability with other individuals.

Extrinsic motivation is captured by the EMI-2 scales' appearance, weight management and ill health avoidance subscales. The EMI-2 appearance subscale refers to exercise motives about improving physical attributes. The weight management subscale concerns the use of exercise to control body mass. The ill health avoidance subscale refers to individuals exercising to prevent further health problems.

### 1.1.9 Stages of Change and Exercise Motivation

Ingledew, Markland and Medley (1998) studied the Stages of Change Theory (Prochanska, Diclemente & Norcross, 1992) and exercise motivation among 425 healthy British government employees. They used the Exercise Motivation Inventory-2 (EMI-2) and defined intrinsic motivation as enjoyment and revitalization while extrinsic reasons were defined as appearance and weight management. The Stages of Change in exercise participation measure (Marcus, Selby, Niaura & Rossi, 1992) and the EMI-2 were assessed at baseline and at 3-month follow-up. The results indicated that intrinsic motivations were at a low level in the precontemplation phase and increased during the contemplation phase, decreased in the action phase and increased during the maintenance phase. The extrinsic motivations were at an average level in the precontemplation phase, increased in the action phase and...
decreased in the maintenance phase. According to these researchers during the initial and adoption phases of an exercise programme extrinsic motivations such as health or fitness motives may be most important and these exercise motivations change depending upon the stage of exercise involvement (Ingledew et al., 1998).

In summary, a review of the exercise motivation literature shows that there are inconsistencies in the relevant research regarding the theoretical and operational definitions of intrinsic and extrinsic motivation. According to CET, intrinsic motivation fosters exercise adherence while extrinsic motivation is linked to discontinuation from behaviours such as exercise. In the present study, the concepts of intrinsic and extrinsic motivation were related to Cognitive Evaluation Theory principles. However, prior research has found that there are some exercise motives which do not fit the intrinsic or extrinsic dichotomy and these were not included as part of the definition of intrinsic and extrinsic motivation (Markland et al., 1993). For example, exercising for social recognition may be considered to be extrinsic but social recognition has been found to strongly related to intrinsic motivation. Affiliation as a reason for exercise was considered to be intrinsic by one researcher and extrinsic by another researcher (Kasser et al., 1996; Mullan et al., 1997). Competition as a motive for exercise was found to have both controlling and informational aspects so it was not included as part of the definition of intrinsic and extrinsic motivation (Ryan, Vallerand & Deci, 1984). The same process was used to select which subscales were to be excluded from the EMI-2 thus affiliation, positive health, competition, strength and stress management were not included as part of the definitions of intrinsic and extrinsic motivation. In the
present study following a review of the relevant research and according to Cognitive Evaluation principles intrinsic motivation was defined as Enjoyment, Challenge and Revitalization. Extrinsic motivation was defined as the reasons for exercising due to Appearance, Weight Management, Ill Health avoidance and Health Pressures.
Chapter 1.2: Psychological Reactions after Myocardial Infarction

The onset of sudden coronary illness appears to cause sustained distress to some patients while others recover physically, psychologically and return to work or normal daily living. Reduction in negative affect occurs naturally over time (Oldridge et al., 1994). The aim of cardiac rehabilitation programmes is to accelerate the recovery of physical and psychological functioning and to help patients to return to normal activities after a coronary event. Lewin (1992) estimates that between 40%-50% of coronary patients do not return to work due to psychological reasons. Blumenthal and Wei (1993) add that “depression, low morale, and psychological distress are significant predictors of mortality among patients sustaining MI. Thus, emotional problems contribute to the increased risk of mortality as well as to psychological, social, and economic maladjustment in such patients” (p. 326).

Since the early 1980’s, researchers have begun to focus on the role of psychological factors which appear to have a critical influence over patients’ recovery from illness (Ades, Waldmann, McCann & Weaver, 1992; Blumenthal, Williams, Wallace, Williams & Needles, 1982; Denollet, Sys, Stroobant, Rombouts, Gillebert & Brutsaert, 1996; Doerfler, Pbert & De Cosimo, 1997; Julkunen et al., 1994; Linden, Stossel & Maurice, 1996; Moser & Dracup, 1995; Oldridge, Streiner, Hoffmann & Guyatt, 1994; Stewart, Hirth, Klassen, Makrides & Wolf, 1997). In recent years, researchers have developed the Causal Model of Invalidism to explain the process of psychological distress and dependency in coronary patients (Riegal, Dracup & Glaser, 1998). They tested the assumptions that poor health perceptions lead to emotional distress and in turn
leads to dependency. It was found that perceptions of poor health and interpersonal dependency were linked to high levels of emotional distress (Reigal et al., 1998).

1.2.1 Definitions of Psychological Distress

For the purpose of the present study psychological distress was defined as the experience of the symptoms of depression, anxiety and stress experienced over the last week. Depression relates to feelings which are characterised by significantly lowered mood, lack of interest in activities that are normally pleasant, negative outlook about life and lack of motivation. “Feeling down” is a common and a normal experience for all individuals. However, clinical depression can be distinguished from the “normal” depression by its severity, persistence and duration (Fauman, 1994).

Anxiety is also a natural human reaction that all individuals express some time in their lives. According to the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995), the main symptoms of anxiety include autonomic arousal, trembling, shaking, breathing difficulty, heart palpitations, feeling tense, irritable and feeling fearful. However, anxiety can become chronic and it may interfere with quality of life or the individual’s ability to feel relaxed.

Stress was described as “a persistent state of over-arousal which reflects continuing difficulty in meeting taxing life demands” (Lovibond & Lovibond, 1995, p. 33). It is manifested as difficulty relaxing, muscle tension, nervous arousal, being easily upset, irritable, feeling on edge and impatient. Researchers have linked perceived stress which comes from external sources
such as work problems and time pressures to poor rate of recovery from coronary events (Goble et al., 1999).

1.2.2 Relationship between Psychological Distress and Adherence

There appears to be relatively little research that examines the relationship between psychological distress and adherence. This study aims to extend findings from previous research which has found psychological distress to have links with poor adherence to cardiac rehabilitation programmes (Blumenthal, Williams, Wallace, Williams & Needles, 1982). Researchers examined psychological and physical factors that predicted adherence to treatment within a supervised cardiac rehabilitation programme in the USA (Blumenthal et al., 1982). They used several measures to assess adherence: blood pressure, body weight, cholesterol level, exercise stress test results and radionuclide angiography. The Minnesota Multiphasic Personality Inventory (MMPI) was used to measure psychological factors at baseline (Hathaway & McKinley, 1948). The results of multivariate analyses of variance (MANOVA) and stepwise discriminant function analyses revealed that dropouts were differentiated by radinuclide angiography at rest and during exercise. Radinuclide angiography refers to an invasive medical examination where a patient swallows radioactive material which shows up on scans of coronary artery blockages (Goble & Worchester, 1999). In addition, they found that dropouts were more psychologically distressed than those individuals who adhered to the programme. The findings from this study need to be treated with caution as the sample size only included 35 MI patients.

Another study found that trait anxiety was one of the better predictors of adherence to an aerobics programme for women (Klonoff, Annechild &
Landrine, 1994). Researchers found that women who were mildly anxious but not extremely stressed were more likely to initiate the exercise compared to women who were extremely stressed, less comfortable with their weight and physical condition (Klonoff et al., 1994). Again, results from this study need to be treated with caution as the sample consisted of 23 women.

1.2.3 Psychological Recovery after MI

According to Lewin (1993), for some coronary patients the psychological recovery process is more difficult to achieve than the physical recovery after heart attack. He suggests that there are typical emotional responses following MI. Within the first 24 hours the most common emotion is anxiety. As the patients' condition stabilises and the patient realises that they will live, a brief period of euphoria may ensue. However, researchers have found that after the 2\textsuperscript{nd} and 3\textsuperscript{rd} days 60% of coronary patients report clinically significant levels of anxiety (Lewin, 1992). For coronary patients, there are number of fears which include conducting any physical activity that may cause adverse effects on the heart. If anxiety becomes a way of coping with stress then individuals may feel that they have no control over these emotions and become helpless which starts the cycle once more.

The main reason coronary patients are referred for psychiatric treatment during the 3\textsuperscript{rd} and 5\textsuperscript{th} days is due to depression (Hackett & Cassem, 1971). In fact, several researchers estimate that between 10-35% of coronary heart disease patients have psychological problems which are considered to be outside the normal range (Lesperance, Frasure-Smith & Talajic, 1996; Ladwig, Kieser, Konig, Btreithardt & Borggrefe, 1991; Lloyd & Cawley, 1982; Mayou, 1986; Milani, Littman & Lavie, 1993).
In extreme cases some coronary patients can become “cardiac cripples” a term that was coined in the mid 1960’s to describe when coronary patients symptoms become chronic. For example, some coronary patients fear normal physical activity, such as mowing the lawn and having sexual relations with their partner. These patients tend to experience excessive fatigue, helplessness, and over dependency on family members (Mullinax, 1995). They limit their usual activities even when it is medically acceptable to continue participating in these activities (Ewart, Barr-Taylor, Reese & Debusk, 1983).

1.2.4 Patient Characteristics that Influence Adherence

Researchers have gathered evidence that suggests that certain patient characteristics influence recovery from coronary heart disease (Oldridge et al., 1978; Oldridge et al., 1981; Oldridge et al., 1983). For example, younger patients and blue collar workers were found to be more fearful than those individuals with inactive occupations, elderly or retired (Cay, Vetter, Phillip & Dugard, 1972). Some of the most common concerns are related to fears of sustaining another episode, physical disability, and unemployment during the first few weeks after a coronary event. Studies have examined depression as a risk factor for coronary artery disease. For example, researchers assessed medical students records between 1948 and 1964 and found that clinical depression was an independent risk factor for coronary episodes (Ford et al., 1998). Maeland and Havik (1989) found that the main predictors of readmission to hospital were elevated levels of anxiety and depression at discharge, poor patient knowledge about cardiac lifestyle and history of hospital readmission. Thus, it appears that there are a number of psychological factors that are
person specific and may impact upon the successful rehabilitation of the coronary patient.

In summary, the definitions of exercise motivation and the various measures that have been used by researchers to operationalise the construct were examined. Exercise motivation was broken into intrinsic and extrinsic motivation according to Cognitive Evaluation Theory (CET) principles. CET proposes that intrinsic and extrinsic motivation are linked to adherence to treatments such as cardiac rehabilitation. Furthermore, researchers have identified that MI patients have psychological reactions, which affect recovery. Some researchers suggest that patients who do not receive adequate psychological intervention after the coronary event may be at a greater risk of developing preoccupation with physical symptoms as well as a loss of confidence and difficulties with adjustment to illness (Lewin, Robertson, Cay, Irving & Campbell, 1992; Moser & Dracup, 1995). Following is a review of the research which explains the measurement issues surrounding exercise adherence within cardiac rehabilitation.
Chapter 1.3: Recovery from Cardiovascular Disease and Exercise Adherence

Myocardial infarction (MI) is the medical term for heart attack (National Heart Foundation, 1996). MI’s are the result of coronary heart disease (CHD). CHD is exhibited as angina pectoris, myocardial infarction, arrhythmias, sudden death and non sudden death (Dishman, 1988). The major cause of CHD is the formation of blockages in the arteries, a condition called atherosclerosis (Ice, 1985). MI’s occur as a result of complex interactions, when the blood supply to the heart is occluded by a blood clot blocking one or more of the coronary arteries. It occurs usually at a site in the coronary artery which has an atherosclerotic narrowing (Cox, 1997). Depending upon the severity of the attack, the damage to the heart muscle from an MI reduces the ability of the heart to function adequately (Cox, 1997).

MI is the leading cause of death in Australia and among western industrialised countries (Dishman, 1988; Oldenburg, Perkins & Andrew, 1985; Radtke, 1989). According to the National Heart Foundation (1996), one Australian dies from cardiovascular disease every 10 minutes. Kannel and Larson (1993) estimated that one in six heart attacks results in instant and sudden death. Many sudden MI deaths occur in non-hospital settings, and one in three MI’s are unrecognised by patients due to the physical symptoms being similar to other illnesses. It is important for individuals at risk of developing CHD to engage in exercise therapy to help prevent and possibly also modify the effects of atherosclerosis (Ice, 1985).
Results from epidemiological longitudinal research such as the Framingham Study in the United States have indicated that the causes of MI and coronary atherosclerosis are usually multifactorial (Kannel & Larson, 1993). They are related to a number of characteristics (risk factors) which predispose certain individuals to the early development of coronary heart disease (Dishman, 1988; Ice, 1985; Klinger, 1984).

Risk factors associated with MI include lifestyle factors such as cigarette smoking, high cholesterol levels, high blood pressure, lack of exercise, diabetes and Type A behaviour. Other risk factors include gender, obesity, abnormalities with blood clotting processes, abnormalities within the circulatory system and family history of cardiovascular disease (Kannel & Larson, 1993). Since the 1950’s, health care professionals’ have developed multimodal cardiac rehabilitation programmes which aim to reverse the effects of CHD.

1.3.1. Cardiac Rehabilitation

According to Oldridge (1995), a proper cardiac rehabilitation regime includes changes in lifestyle, diet and exercise to improve health and recovery of MI patients. Cardiac rehabilitation (CR) can be defined as “the sum of activity required to ensure cardiac patients the best possible physical, mental, and social conditions so that they may, by their own efforts, regain as normal as possible a place in the community and lead an active, productive life” (World Health Organisation Technical Report, 1964, 270). Yet, surprisingly, patient adherence to post-MI exercise therapy programmes, a major component of rehabilitation effectiveness, is relatively poor, and similar to that of healthy individuals engaged in exercise programmes (Emery, 1995). Some researchers estimate that only 20% of eligible coronary artery disease (CAD) patients
participate in structured cardiac rehabilitation programmes and researchers suggest that many programmes are underutilised (Cox, 1997; Smith, 1989). MI patients who have already faced possible death might be expected to be more motivated to enter and follow an exercise regime which could be lifesaving. However, researchers have shown that this is not always the case (e.g., Oldridge, Wicks, Hanley, Sutton & Jones, 1978).

1.3.2 Rates of Adherence to Cardiac Rehabilitation

According to several authors, approximately 50% of coronary patients discontinue participation with exercise therapy within 6 to 12 months of starting their programme, a figure similar to the dropout rate for healthy adults who begin exercise programmes (Dishman, 1988; Oldridge, 1988; Oldridge, 1995; Oldridge & Streiner, 1990; Ready, 1996). Relapse into previous unhealthy sedentary patterns in the long-term is a common phenomenon for CR patients, healthy exercisers, patients who enter drug and alcohol addiction treatments and participants in weight loss programmes (Oldenburg, Owen, Graham-Clarke & Gomel, 1992; Sallis, 1990). Thus, understanding the reasons patients do not adhere may provide direction for more effective interventions.

Patient adherence has been studied with various types of treatments and different populations such as athlete injury prevention (Udry, 1997); coronary artery bypass grafting (Oldenburg, Martin, Greenwood, Berstein & Allan, 1995); weight management (Summerbell, Watts, Hoggins & Garrow, 1998); treatment for renal disease (Oldenburg, Macdonald & Perkins, 1988); exercise programmes for healthy adults (Gale, Eckhoff, Mogel & Rodnick, 1984); and supervised walking programmes for women (Ready, 1996). A review by Haynes, Taylor and Sackett (1979) indicated that there are over 200 factors
involved in patient adherence to treatment regimes. In particular, researchers have found that there is a link between adherence within supervised structured CR programmes and longer-term adherence (Hellman, 1997; Oldridge, 1988; van Elderen-van Kemenade, Maes & van den Broek, 1994).

In more recent studies, models have been used to explain the reasons individuals participate in fitness, exercise, sport and rehabilitation to determine the factors that influence adherence to treatment programmes (e.g., Corneya & McAuley, 1995; Garcia & King, 1991; Hausenblas, Carron & Mack, 1997). For example, Dzewaltowski (1989) examined Social Cognitive Theory and the Theory of Reasoned Action (TRA) to construct a model that would predict exercise behaviour. Path analysis revealed that TRA explained only 5% of the exercise behaviour. Self-efficacy and self-evaluated dissatisfaction increased the predicted exercise behaviour variance to only 16%. It clearly evident from the research that there is a gap between the theory and the measurement of the constructs of exercise adherence (Biddle & Smith, 1991; Singer, 1984; Ryan, Vallerand & Deci, 1984).

1.3.3 Definitions of Compliance and Adherence

The terms 'compliance' and 'adherence' have been used interchangeably in the literature. Emery (1995) suggests that one reason for the use of both terms is due to greater use of the term 'compliance' in earlier studies, and use of the term 'adherence' in more recent research. In fact, some authors (e.g., Becker, 1985; Meichenbaum & Turk, 1987) argue that there are differences between the terms, while others make no distinction between the terms (Ice, 1985; Ley, 1979, Sluijs & Knibbe, 1991).
Dishman (1988) described the term ‘compliance’ as referring to the short-term following of a treatment plan, while adherence refers to the long-term maintenance of behaviour change. One formal definition of patient compliance is “the extent to which patients are obedient and follow instructions, proscription, and prescriptions of (health care providers)” (Meichenbaum & Turk, 1987, p. 20). According to this definition, patients are passive recipients of health advice and they should conform to their doctor’s recommendations in order to maintain good health (Becker, 1985; Emery, 1995). Patients are noncompliant when they fail to cooperate with the health care providers advice (Klinger, 1984). This interpretation implies that planning the treatment intervention, decision-making and problem solving does not involve the patient (Nicholas, 1995). The health care provider directs the treatment prescription unilaterally in order to relieve the patient’s symptoms (Dishman, 1994; Meichenbaum et al., 1987).

Adherence on the other hand has been described as a “more active, voluntary collaborative involvement of the patient in a mutually acceptable course of behaviour to produce a desired preventative or therapeutic result” (Meichenbaum & Turk, 1987, p. 20). This definition includes an assumption that the patient will choose to follow a plan or goal which may or may not be prescribed by a health professional. The individual selects to follow a plan and shares responsibility in organising the way the plan is to be implemented. The concept of adherence implies a consensual relationship between health care provider and consumer. Subsequently, non-adherence is due to the individual’s choice and the health care professional’s inability to convince the person that the treatment is in their best interest. Dishman (1994) argues that the term
adherence may be more appropriate for describing an individual's actions over the long-term in order to prevent the recurrence of symptoms once an intervention has been completed. For the purpose of this study, the term adherence will be used as the responsibility for treatment implementation lies with both the coronary patient and treatment provider.

Compliance refers to the patients' willingness to follow health care professionals' instructions and to follow any programme or prescribed plan, whether it involves medication or other activities, whether preventive or curative (Haynes et al., 1979). Examples of adherence to healthy lifestyle practices include reducing the frequency of cigarette smoking and alcohol consumption; improving proper nutritional habits; taking regular exercise; coping with stress and effectively making and keeping medical and dental appointments (Becker, 1985; Brannon & Feist, 1996). According to Sluijs, Kok and van der Zee (1993) “compliance usually is not a matter of all or nothing but has many gradations” (p. 772).

Operational definitions of exercise adherence understandably differ from study to study (see Table 1.2). For example, exercise adherence measures include attendance, exercise stress test, performance, ratings, 7-day activity recall interviews or a combination of measures. In addition MI patients who are taking part in an outpatient rehabilitation programme may report that the frequency of exercise is in accordance with the prescribed plan, while corroborative evidence (e.g., a treadmill exercise test) shows no improvement in cardiovascular fitness.
Table 1.2

Review of studies using various measures of exercise adherence

<table>
<thead>
<tr>
<th>Measures of Adherence</th>
<th>Studies using various measures</th>
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* Note these authors used a combination of adherence measures
Similarly, a patient may attend the required exercise sessions in their hospital programme but not exercise at the proper intensity level. The MI patient might modify cigarette smoking and diet as part of the cardiac rehabilitation programme, but replace this habit with increased caloric input, thereby reducing the programme's effectiveness. Because patient adherence is a multidimensional concept which involves many different behaviours (Becker, 1985) it is necessary to examine the formal and operational definitions of short-term and long-term adherence.

1.3.4 Short-term Adherence

The present research focuses on short-term adherence while MI patients attended the hospital programme and at follow-up which was unsupervised. In CR, short-term adherence refers to the extent to which the coronary patient follows the hospital treatment programme (Sluijs & Knibbe, 1991). That is, patients are supervised by health care professionals within hospital over a short period of time, usually 6 - 8 weeks. The patient attends the hospital programme and relatively passively follows hospital routines. In general, the health care professional monitors CR adherence by the use of interviews, questionnaires, logs of activity, attendance and exercise testing procedures (Nicholas, 1995). Sluijs and Knibbe (1991) contend that it is much easier to monitor patient adherence within a treatment programme as health care professionals are able to observe the patient and they are supervising within the CR programme. Short-term adherence may be treatment specific and influenced by different factors from long-term adherence (Cohen, 1979; Radtke, 1989).
1.3.5 Long-term Exercise Adherence

Long-term adherence refers to the maintenance of the treatment plan after the completion of the prescribed programme (Dishman, 1994). That is, individuals may continue to follow the intervention unsupervised at home or in a community setting (Naughton, 1992). Upon completion of the CR programme in hospital, the participant either follows the health care professionals’ advice or disregards the information and skills training received within the formalised programme. The health care provider is not in the position to observe the patient or to have a major influence over the participant during this phase of treatment (Nicholas, 1995). Consequently, long-term patient adherence is dependent upon self-motivation and self-regulation to maintain the treatment intervention over time.

The aim of CR treatment intervention during the out of hospital phase is mainly preventative (Nicholas, 1995). That is, coronary patients are expected to make lifestyle changes in order to prevent further occurrences of CHD or secondary prevention strategies. During this phase symptoms of CHD may be absent. As such, coronary patients may feel that they are cured and no longer need to follow the prescribed intervention (Sluijs & Knibbe, 1991). In addition, assessment of long-term adherence becomes a difficult task for the health care professional as patients are asked to voluntarily attend the hospital after the completion of the outpatient hospital programme.

Another difficulty in the area of patient adherence is that CR treatment efficacy is questionable in the long-term, as coronary patients tend to revert to the same unhealthy lifestyle habits upon completion of the hospital programme (Oldenburg et al., 1992). The relapse rate for CR programmes in the long-term
is similar to the relapse patterns for patients undergoing treatment for smoking, alcohol, plasma lipids, drug addiction (Carmody, Senner, Malinow & Mattarazzo, 1980). According to one review of randomised CR trials, the rate of dropout was between 2-25% at 3 months, and 40-50% by 6 months (Bittner & Oberman, 1993).

1.3.6 Relationship between Short and Long-term Adherence

Reviews of the CR literature have found that long-term follow-up studies of exercise adherence are scarce (Dishman, 1991; Robinson & Rogers, 1994). The available research suggests that there is a relationship between initial adherence with CR and long-term behavioural changes. For example, researchers found that 19% of MI patients who exercised within the CR programme were exercising during the three and a half year follow-up (Prosser, Carson & Phillips, 1985). Similar results were reported for another study that examined the effects of health education for MI patients who were followed-up two years after cardiac rehabilitation (Van Elderen, van Kemenade, Maes & van den Broek, 1994).

1.3.7 Measurement of Adherence

In earlier studies (e.g., Gale et al., 1984; Oldridge, Wicks, Hanley, Sutton, Jones & 1978), short-term non-adherence was classified according to 'avoidable' reasons (e.g., lack of interest, inconvenient location and difficulty with programme) and 'unavoidable' reasons (e.g., medical and moving away from area). Distinguishing between avoidable and unavoidable reasons for nonadherence enables researchers to work on factors that may be enhanced within the CR programme. The avoidable reasons are often classified as cognitive factors or lack of motivation, while unavoidable reasons are in most
cases not amenable to change (Oldridge, 1995). Researchers have concluded that more than one method is required to assess the extent of patient adherence to treatment (Oldridge, 1995; Robinson & Rogers, 1994).

1.3.8 Attendance

One method commonly used to assess CR short-term adherence, is attendance or discontinuation (i.e. drop-out) from a formalised treatment regimen. In addition, short-term adherence can be expressed as a percentage or ratio (e.g., 100%, 80%, 50%) and according to a quantitative assessment (Oldridge, 1995; Oldridge & Streiner, 1990). For example, in a study of healthy participants engaging in a structured exercise programmes, Gale, Eckhoff, Mogel and Rodnick (1984) designated two categories of drop-outs. Early dropouts were defined as participants who attended less than 10% of the prescribed 6-month exercise programme, while individuals who did not adhere were defined as those who attended between 10-49%. Individual’s who adhered to exercise attended more than 50% of the programme. It appears that attendance as a measure of adherence varies according to what is considered to be adequate adherence for the particular treatment programme.

Oldridge (1988) and Dishman (1991) argue that attendance is one marker of adherence, and other subjective and objective measures should be used to corroborate the extent to which each participant follows the prescribed treatment programme. For example, short-term adherence for the present research, is measured by attendance at Westmead hospital's inpatient CR programme. In addition, exercise adherence is measured by self reported daily exercise log as well as pre and post programme exercise stress test. The exercise stress test provides an objective measure of exercise adherence and
supports the self-reported daily exercise log of physical activity. Short-term adherence may be treatment specific and influenced by different factors from long-term adherence (Cohen, 1979; Radtke, 1989).

1.3.9 Clinicians’ Estimates

There appears to be agreement among authors that the physician or health professional may overestimate patient adherence (e.g., Becker, 1985; Cohen, 1979; Ley, 1988). For example, one researcher found that medical practitioners incorrectly classified 79% of their patients medication usage (Brody, 1980 cited in Ley, 1988). Physicians may overestimate levels of adherence as they are not in the position to accurately monitor the patient. Consequently, physician estimates appear to have relatively low validity. Becker (1985) suggests that it is not favoured as an assessment tool for measuring patient adherence. The physician often relies on the patient’s accurate self report of medication usage to make an assessment of adherence (Ley, 1988). In CR programmes, the role of general practitioner and cardiologist appears to be a supportive role.

1.3.10 Direct Observation

Another method of assessing adherence involves observation by hospital personnel or the patients’ significant other. This method may also be prone to inaccuracy because most patients cannot be observed 24 hours a day (Brannon et al., 1996). In addition, constant monitoring of the patient by a spouse creates situations which may artificially foster adherence, thus confounding the results of the research (Becker, 1985). One example of research using spouses as observers, MI patients were offered a health education and counselling programme during and after hospitalisation (Van
Elderen et al., 1994). Sixty MI patients were divided into control, experimental and education groups. They were asked to rate the amount of time (e.g. spending more time, same amount of time or less time) spent doing physical activities. Their self-report exercise adherence ratings were compared to smoking cessation and healthy eating habits in order to examine whether the health education programme lead to an increase in healthy behaviour. Furthermore, researchers asked partners to verify self-reported ratings of treatment adherence in order to validate their findings. However, in the same study researchers only recruited 20 partners out of the total of 60 MI patients. Thus, in some circumstances the use of direct observation or monitoring by spouse may not be practical.

1.3.11 Patient Self-report

The use of patient self-report has been more widely used in adherence research due to its long-term predictive validity (Ley, 1988). This method involves the reporting of adherence by interview, daily record, ratings and chart or graph method. In particular, several researchers have used self-report adherence ratings to estimate how closely participants are following a prescribed regimen (Hellman, 1997; Hilbert, 1985; Klinger, 1984; Radtke, 1989; Sluijs, Kok & Van der Zee, 1993; Van Elderen- Van Kemenade, Maes & Van den Broek, 1994). For example, Klinger (1984) interviewed 40 male and 20 female MI patients four to six months after hospital discharge. Patients were asked to provide ratings for the factors that influence and inhibit adherence. Results of the study indicated that personal, environmental and regimen factors influenced the MI patients ability to adhere to the hospital CR programme.
However, some researchers warned that the patient self report method may be imprecise due to social desirability effects (Becker, 1985; Ley, 1988; Nicholas, 1995; Vita & Owen, 1995). Other inaccuracies with the self report method may occur because some patients, as well as significant others, may find it difficult to rate their own level of adherence (Brannon et al., 1996; Ley, 1988). Roth and Caron (1978) found that approximately 30% of the hypertensive patients reported that they were taking the correct dosage of medication but a pill count indicated that they were using between 2% to 130% of the prescribed medication. According to Nicholas (1995) the patient self-report method should be supplemented with other more objective measures of adherence to assess the extent to which patients followed their treatment.

**1.3.12 Physiological Measures**

Patient adherence can also be measured through biochemical analyses such as the analysis of blood and urine samples. For example, a coronary patient with a high cholesterol level may be advised by the medical professional to alter unhealthy eating habits and exercise. The patient appears to conform to the advice by altering their diet, while a blood test reveals the cholesterol levels are the same or higher than previously tested. Blood test results have the ability to be affected by stress, abnormal blood pressure and a family history of cholesterol problems (National Heart Foundation, 1996). According to Ley (1988) the results of biochemical analysis should be treated with caution as individual differences in the absorption and excretion of chemicals can create a distorted picture of patient adherence.
1.3.13 Exercise Stress Test

The use of physiological measures such as the exercise stress test prior to and at the completion of treatment programme has been found to be an efficient method to corroborate changes in patient exercise adherence (Ley, 1988). The exercise stress test measures oxygen consumption (ml/kg/min) to determine changes in fitness pre and post exercise programme. For example, researchers evaluated MI patients at baseline, 4 months, 8 months and 12 months into a CR treatment programme (Oldenburg, Allen & Fastier, 1989). The hospital assessment consisted of risk factor, psychological, biochemical and exercise testing procedures using the symptom-limited protocol (Naughton, Sevelius & Balke, 1973). The researchers found that over the course of the programme there was an average 14% improvement in exercise training by 12 months for both the routine care and education groups and a 30% improvement for the behavioural group. The routine care group received medical intervention in the coronary care unit and no cardiac rehabilitation. This study found that the use of the physiological measures determined that the psychological and health education programmness were beneficial to MI patients over routine care. Consequently several authors have used physiological measures as indicators of short-term and long-term adherence (Blumenthal et al., 1982; Fielding, 1989; Gale et al., 1984; Oldridge et al., 1978; Stewart, Kelemen, Ewart & 1994).

1.3.14 7-day Activity Recall Method

The 7-day activity recall method was found to be a reliable and valid measure of physical activity in US college student samples (Dishman & Steinhardt, 1988). Hellman (1997) interviewed 349 CR patients at 9, 12 and 18 months to determine stages of change, self efficacy and the 7-day activity recall
method to measure adherence to exercise therapy. She examined the average daily energy expenditure of physical activity by asking participants to recall the amount frequency, intensity of physical activity for the last 7-days. Exercise adherence was calculated by classifying the weekly amounts of time spent engaged in exercise. Results from the study demonstrated that the participants who had adhered to their programme for at least 6 months or more were significantly more active than the other participants.

1.3.15 More than One Measure of Treatment Adherence

Researchers use a number of adherence measures to assess outcomes. For example, one study classified adherence by attendance within the treatment programme, physiological data and self-report measures (Blumenthal, Williams, Wallace, Williams & Needles, 1982). Individuals who adhered attended more than 75% of prescribed post-MI exercise therapy sessions, while dropouts were patients who attended less than 25% and discontinued the CR programme. The exercise stress test results using the Balke protocol (Balke & Ware, 1959), provided evidence to support the participants' claims that they had been exercising at appropriate levels. Self-report measures consisted of patients recording the frequency of physical activity. Subsequently the exercise testing measures were relatively objective and verified the subjective self-report measures to determine the extent to which patients adhered to exercise therapy.

A strong theme emerging from the review of exercise adherence literature research was the lack of consistency in definitions of adherence. Researchers have suggested that the use of more than one objective and subjective measure should provide the most accurate picture (Dishman, 1991).
Oldridge (1988) estimates that adherence to CR ranges between 75-80% while 100% adherence to treatment could not be expected as coronary patients are required to make more than one lifestyle change at once. Therefore in the present study there is a need to compare exercise adherence rates using a number of measures such as attendance, performance using exercise stress test results, self reported adherence ratings, and 7-day activity recall method.
Chapter 1.4: Health Benefits of Post-MI Exercise Therapy

Each year in Australia more than 53,000 individuals die from coronary heart disease which includes heart attack and stroke (National Heart Foundation, 1996). Australian population trend data suggest that the least likely to be physically active are women, middle-aged and elderly, migrants, parents of young children and those individuals with lower educational achievement (National Heart Foundation, 1998). In addition, Sallis (1990) studied healthy exercisers and found that relapse “is a complex and dynamic process, with a succession of minor lapses, total relapses, and recoveries after varying lengths of time” (p. 574). Non-adherence to regular exercise regimes, smoking, high blood pressure, high cholesterol, obesity and relapse into former unhealthy lifestyle habits are common phenomena for individuals who suffer from CHD even when the benefits outweigh the costs.

A growing body of research has documented the benefits of regular moderate exercise for the maintenance of overall health, physical fitness, enhancement of mood and risk factor modification for coronary heart disease (Bittner & Oberman, 1993; Blair et al., 1996; Dubbert, 1992; Elward & Larson, 1992; Franklin, Gordon & Timmins, 1992; Lewin, Robertson, Cay, Irving & Campbell, 1992; Pate et al., 1995; Prosser, Carson & Phillips, 1985). Some of the most compelling research evidence supporting the “exercise hypothesis” comes from longitudinal epidemiological studies and meta-analyses of randomised clinical trials of cardiac rehabilitation. For example, according to one review, 4347 cardiac rehabilitation patients were involved in either treatment programmes or were assigned to control groups (Oldridge et al., 1988). Compared to the control groups the CR groups had significant
decreases in cardiovascular mortality and further coronary events. One observational cohort study of 25,341 males and 7080 females examined the relationship between fitness and cardiovascular mortality and all-cause mortality (Blair et al., 1996). Results from this study supported the notion that fit individuals who had a number of risk factors for CHD had lower mortality rates than less fit individuals. However, according to Bittner and Oberman (1993) exercise therapy is not a “panacea” that can provide all the physical and psychological benefits for patients with diseases associated with unhealthy lifestyle.

1.4.1 Physical Benefits of Exercise

Exercise therapy has been found to improve physical outcomes such as treatment for weight loss or maintenance (Schwartz et al., 1991), diabetes (Tonino & Driscoll, 1988), cancer, strengthening of bones, reduction of the chance of osteoporosis (Stillman et al., 1986). Other studies have found support that regular exercise protects against the development and progression of chronic illness and it is a necessary component of individuals well-being (Berlin & Colditz, 1990; Blair et al., 1996; Kannel & Larson, 1993; Paffenbarger et al., 1993). For patients who survive coronary heart disease (CHD) regular exercise has been found to improve the functioning of the heart by reducing the heart muscle’s oxygen needs (Gordon & Gibbons, 1990), reducing the blood platelets tendency to stick (Rauramaa, Salonen, Seppanen & 1986), and enhancing the body’s natural ability to dissolve blood clots (Eichner, 1986).

1.4.2 Psychological Benefits of Exercise

Researchers have found evidence for improved psychological and social benefits of performing regular exercise and attending comprehensive CR
programmes. The benefits include, reduced generalised anxiety (Taylor, Houston-Miller, Ahn, Haskell & Debusk, 1986), reduced symptoms of depression (Newton, Mutrie & McArthur, 1991), enhanced feelings of well-being (Lewin et al., 1992), greater coping skills (Bengtsson, 1983) and more frequent return to work and greater quality of life (Hedback & Perk, 1987). Thus, it appears that exercise therapy not only enhances physical conditions, but it is also linked with positive changes in mood and psychological functioning.

1.4.3 Efficacy of Exercise Therapy

Naughton (1992) warns that exercise therapy on its own is not a treatment solution for all illnesses but it is useful as an adjunct to CR interventions. It is difficult for researchers to make conclusions about the independent effects of exercise therapy within cardiac rehabilitation programmes as they include other forms of treatment such as diet and medication (Bittner & Oberman, 1993). For example, studies of cardiac rehabilitation programme efficacy have found that exercise therapy at a low to moderate intensity has the same benefits as that of moderate to high intensity exercise training (Goble & Worchester, 1999). In Australia cardiac rehabilitation programmes are based upon low intensity exercise which is considered to be acceptable and equally effective for enhancing physical and psychosocial recovery for CHD patients who are, in the majority of cases, elderly (Goble & Worchester, 1999).

1.4.4 Amount of Exercise Training

According to the American College of Sports Medicine (ACSM, 1995) there are broad guidelines about how much exercise is enough to produce cardiovascular benefits for healthy and unhealthy groups of individuals.
Exercise needs to be incorporated into the individuals lifestyle and does not need to be formal or structured to receive the physical and psychological benefits. Researchers found that former college athletes who are no longer exercising have no higher fitness levels than those individuals who were sedentary (Paffenbarger, Hyde & Wing, 1984; Paffenbarger, Hyde, Wing & Hsieh, 1986). Thus, any health benefits that the individual receives due to regular exercise can be lost through periods of inactivity.

The ACSM (1995) recommend a minimum standard of 20 to 60 minutes of continuous exercise at a moderate intensity, three times a week. The average duration for exercise is recommended as 20 to 30 minutes (ACSM, 1995). Improvement in cardio-respiratory fitness has been found to be directly related to the frequency, duration and intensity of exercise. As such, the type of exercise should be aerobic in nature in order to condition the heart. Aerobic exercise increases the activity of pulmonary and cardiovascular systems. It includes such activities as walking, hiking, machine based stair climbing, running, step aerobics, swimming, cycling, rowing, arm and leg ergometry, dancing, skating, cross country skiing, rope skipping or endurance game activities (ACSM, 1995). In Australia, the National Heart Foundation (1996) has formulated exercise guidelines for the majority of the Australian population who do not exercise. Individuals who are severely unfit should start an exercise programme which is shorter in duration and then build up the frequency, intensity and duration as physical fitness improves.

1.4.5 Definition of Moderate Exercise

The latest ACSM (1995) guidelines suggest that 30 minutes of moderate activity can be accumulated when any physical activity is performed at an
intensity parallel to brisk walking. Thus, the amount of moderate physical activity is more important than the way the physical activity is performed. Informal bursts of physical activity which include general cleaning of the home, mowing the lawn, gardening, and golf that involves pulling the cart or carrying clubs can be considered as part of an individual's exercise routine (Pate et al., 1995).

There appears to be no "gold" standard for defining moderate exercise due to the difficulty in measuring overall energy expenditure (Dubbert, 1992). Researchers have tended to use metabolic equivalents as guides to classifying moderate activity (Blumenthal, Williams & Wallace, 1982; Franklin, Gordon & Timmins, 1992; Greenland & Chu, 1988). Metabolic equivalents (MET's) are measures of oxygen uptake through the lungs (Goble & Worchester, 1999). One MET is the energy expended per minute while sitting quietly which is equivalent to 3.5 ml of oxygen uptake per kilogram of body weight per minute (See Appendix 4 for examples of common physical activities by intensity of effort in MET scores or kilocalories per minute). Every daily activity is classified according to the amount of energy expended and categorised as light, moderate and vigorous physical activity. ACSM (1995) guidelines suggest that individuals who have some physical fitness (> 5 METs) should exercise 3 to 5 sessions per week.

Researchers have defined moderate physical activity 90% of the maximum heart rate (HR max) and sedentary individuals as 40 to 50% of maximal oxygen consumption (VO² max). The VO² max value is an estimate of fitness that is provided through an exercise stress test (Zohman, 1984). While other researchers classify light sports activity as < 4.5 METs and moderate
vigorous physical activity as > 4.5 METs (Paffenbarger et al., 1993). One study defined moderate physical activity as being equivalent to 3-5 METs and vigorous is > 8 METs (Dishman & Steinhardt, 1987). The latest recommendation comes from a group of experts from the Centers for Disease Control and Prevention. They have released guidelines that state light physical activity is equivalent to < 3 METs, moderate ranges between 3.0-6.0 METs and vigorous is > 6.0 METs (Pate et al., 1995; See Appendix 4).

1.4.6 Exercise Intensity

There appears to be no consistent way of assessing the intensity of effort and a number of techniques have been used by researchers. Also, it appears that some authors have not assessed intensity of effort to keep the analysis of exercise adherence simple. For example, Dzewaltowski (1989) stated in his article that attendance was the only criterion that was used to measure exercise adherence as students had difficulty in distinguishing between the concepts of frequency, duration and intensity of effort.

Researchers have assessed intensity of effort in a number of ways including the use of symptom identification; the use of telemetry monitoring; ratings of perceived exertion using the Borg's scale (Borg, 1970), checking the heart rate during exercise. Heart rate can be measured by beats per minute during exercise through palpitating or feeling of the carotid, temporal and radial arteries. This method is not as effective as telemetry monitoring due to medications such as beta blockers, antihypertensives and antidepressants possibly affecting the resting heart rate. Some researchers measure the intensity of effort by using the perceived exertion scale (Corneya & McAuley, 1995; McAuley & Corneya, 1992; McAuley, Courneya, Rudolph & Lox, 1994)
while others use exercise stress test results (Blumenthal et al., 1982; Oldridge & Streiner, 1990; Ready, 1996) and ratings of exercise intensity (Hellman, 1997). Consequently, there are a number of methods of measuring intensity of exercise.

In the context of the present study, the following is a summary of the chapters related to exercise motivation, psychological distress, adherence, and health benefits of exercise. Previous researchers found that there were links between self-motivation, psychological distress and adherence to CR programmes (Blumenthal, Williams, Wallace, Williams & Needles, 1982; Dishman & Gettman, 1980). The present study extends the previous research by using the combination of these factors within the Australian context. The present study attempted to overcome a number of limitations and methodological shortcomings identified in the exercise adherence and motivation research. One limitation in prior studies appears to be the lack of theoretical development to explain the links between motivation and adherence. In this study, Cognitive Evaluation Theory was used to describe the motivation and its links to exercise adherence. Another limitation in prior research was the varying measures of exercise motivation, intrinsic motivation, extrinsic motivation and adherence to exercise. For example, researchers used limited definitions of intrinsic and extrinsic motivation (Ingledew, Markland & Medley, 1998). In the present study, broad operational definitions of intrinsic and extrinsic motivation were used. Also, a review of the exercise adherence research found that some researchers use one measure to determine adherence (e.g. Cready & Long, 1985) while other researchers use a combination of measures (e.g. Gale, Eckhoff, Mogel & Rodnick, 1984). In the
present study, a number of exercise adherence measures were used during the hospital programme and at follow-up in order to establish how variations in adherence measures may effect results. In addition, prior studies used limited and varied definitions of moderate exercise (e.g. attendance within programme). In the present study a broad definition of moderate exercise taken from ACSM (1995) guidelines and it included frequency, duration and intensity of effort. In the following chapter the rationale, aims and hypotheses for the present study will be made explicit.
Chapter 2: The Present study

2.1 Rationale and Aims

Researchers and practitioners have long acknowledged that effective cardiac rehabilitation (CR) requires that psychological factors are addressed because they appear to influence participation, treatment outcomes and the coronary patient’s quality of life after a heart attack. Understanding exercise motivation and psychological distress will provide CR practitioners with essential resources to guide the design of educational material to meet the needs of patients after heart attack. Another significant undertaking for the present study is to investigate and compare exercise adherence during the outpatient hospital programme and at five month follow-up using a number of measures. The present research will provide some insight into adherence rates dependant on different measurement methods.

2.2 Exercise Adherence

One of the main aims of the present study was to examine MI patients’ adherence rates to the CR programme in the hospital and at five month follow-up using multiple measures of adherence. In addition MI patients’ reasons for non-adherence to the hospital programme are described. One limitation in prior studies appears to be the inadequate number of studies regarding the effectiveness of treatment interventions during the unsupervised segments of CR programmes (e.g. Blumenthal et al., 1982; Carmody et al., 1980; Hellman, 1997; Oldridge et al., 1983; Radtke, 1989; van Elderen et al., 1994). The present study addresses these issues by assessing both the supervised component and follow-up after a 5 month unsupervised period using
multiple measures of adherence, in order to redress limitations of other studies suffering from the use of only one measure of exercise adherence (Hilbert, 1985; Radtke, 1989).

2.3 Exercise Motivation

There appears to be little research in Australia exploring the relationship between exercise motivation, psychological distress and adherence to exercise therapy within cardiac rehabilitation. Exercise motivation refers to the underlying processes that initiate, direct and maintain physical activity (Frederick et al., 1995). It was operationalised in the present study as motives for exercising including: Ill Health; Positive Health; Health Pressures; Strength; Weight Management; Revitalisation; Nimbleness; Stress Management; Enjoyment; Challenge; Appearance; Affiliation; Competition; and Social Recognition.

One of the aims of the present study is to explore what aspects of exercise motivation (EMI-2) appear to motivate MI patients to exercise at entry to the hospital programme and at five month follow-up. There appears to be very little research which examines changes in exercise motivations over time for MI patients. As such, one aim of the study will be to describe the relative strength of different exercise motivations over time. For MI patients, it was expected that motives for exercise would be predominantly health related. In addition, in order to extend previous research, comparisons were conducted to examine the exercise motivations between MI patient and healthy individuals.

Another limitation in prior studies has been a lack of theoretical development in relation to exercise motivation and adherence. In this study,
Cognitive Evaluation Theory (CET) describes the link between exercise motivation and adherence. It is postulated that according to CET, individuals who are intrinsically motivated will be more likely to adhere to their post-MI hospital programme exercise programme than individuals who are extrinsically motivated. The present study explores whether 1) MI patients were predominantly intrinsically or extrinsically motivated, 2) whether there was a relationship between intrinsic and extrinsic motivation and exercise adherence.

2.4 Psychological Distress

As well as considering the factors that motivate MI patients to exercise, the present study aims to extend previous research that examined psychological factors and cardiac rehabilitation treatment adherence (Ades et al., 1992, Blumenthal et al., 1982; Julkunen et al., 1994; Klonoff et al., 1994; Lewin et al., 1992; Moser et al., 1995; Stewart et al., 1997; Van Elderen-Van Kemenade et al., 1994). Negative psychological distress appears to be part of the normal emotional reaction of survivors of heart attack experience. At least one researcher suggests, that for MI patients, the psychological recovery process is more difficult to achieve than the physical recovery process (Lewin, 1993). Researchers estimate that between 10-35% of MI patients have abnormal psychological reactions (Frasure-Smith et al., 1996; Ladwig et al., 1991; Lesperance et al., 1996). Thus, other aims for the study will be to examine 1) the levels of psychological distress for MI patients, 2) the relationship between psychological distress and exercise adherence, 3) whether psychological distress changes over time, 4) whether MI patients
are more psychologically distressed than healthy individuals and, 5) the extent to which intrinsic, extrinsic motivation and psychological distress are able to predict adherence to exercise. In addition to these aims several specific hypotheses are tested:

2.5 Research Hypotheses

1. Consistent with Cognitive Evaluation Theory, MI patients who adhered to exercise at follow-up would be intrinsically motivated whilst MI patients who did not adhere at follow-up would be extrinsically motivated.

2. According to Cognitive Evaluation Theory, there will be a significant decrease in the levels of extrinsic motivation from entry to follow-up. There will be a significant increase in levels of intrinsic motivation from entry to follow-up.

3. Exercise motivation and psychological distress will predict adherence to exercise therapy.
Chapter 3: Method

3.1 Participants

Fifty participants from the Cardiac Education and Assessment Programme (CEAP) at Westmead Hospital agreed to take part in the study. There were 42 (85%) males and eight (14%) females who completed the survey package. All patients who met the following criteria were eligible to complete the study: 1) diagnosis of MI, 2) physically capable of performing the prescribed exercises; 3) sufficient command of the English language, in order to be able to complete the research protocol; 4) admitted between the months of November 1997 and December 1998.

The Nursing Unit Manager and nursing staff interviewed patients during admission and assessed their level of English by speaking to and interacting with them. They selected those patients who met the criteria for the study. The total number of eligible myocardial infarction (MI) admissions during the data collection period was 100 patients. There was a response rate of 50%.

There were 38 (76%) patients who completed the follow-up interview 5 months from completion of the hospital programme. During the 5 month follow-up of the data collection process there were seven participants (7/38) who wanted to complete the interview questions at home instead of over the telephone. There were twelve patients (12/50) who did not agree to complete the follow-up interview. Eight patients (8/12) stated they did not agree to complete the interview when they filled out the survey package in the hospital. Two (2/12) participants could not be contacted because their telephone was disconnected. Two (2/12) interview packages were returned as the participants
were deceased. There was a response rate of 76% (38/50) for the 5 month follow-up interviews.

Marital status for the full sample was single (12%), married (70%), widowed (4%), divorced (6%), defacto (6%) and separated (2%). Table 3.1 provides the occupations for the sample.

Table 3.1

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>Frequency (n = 50)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Para-Professional</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Self-employed</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Tradesperson</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Plant operator</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Labourer</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Domestic Duties</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Invalid pension</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Retired</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

Table 3.2 presents the age distribution for the MI sample. The age range was from 37 to 82 years with a mean age of 60.4 years and modal age of 40 years. Table 3.2 shows the highest proportion of the sample (34%) was among the 50 to 60 year old patients and the smallest (20%) was from 37 to 50 and 60 to 70 year old MI patients.
Table 3.2
Age Distribution during CEAP

<table>
<thead>
<tr>
<th>Age</th>
<th>37-50</th>
<th>50-60</th>
<th>60-70</th>
<th>70-82</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>10</td>
<td>14</td>
<td>9</td>
<td>10</td>
<td>42</td>
</tr>
<tr>
<td>Females</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Percent</td>
<td>20</td>
<td>34</td>
<td>20</td>
<td>26</td>
<td>100</td>
</tr>
</tbody>
</table>

At a descriptive level the MI sample was characterised by an older age group, as 80% of the sample were aged between 50 and 82 years. Comparisons of male and female death rates in Australia show that men are more likely to die from cardiovascular disease than women of the same age (National Heart Foundation, 1996). Australian death rate comparisons found that at any age men have almost the same coronary death rates as women ten years older (National Heart Foundation, 1996). Another characteristic of the sample was that the majority (85%) were male. This finding is consistent with prior research that suggests these services are utilised less by women and minorities groups (Ades, Waldmann, Polk & Coflesky, 1992; Cox, 1997). In the present study, the cultural status for the MI patient sample was not collected.

3.2 Westmead Hospital’s Cardiac Education and Assessment Programme (CEAP)

CEAP is a phase two cardiac rehabilitation programme which is based at a tertiary referral hospital in Western Sydney, Australia. It is an outpatient programme for patients with cardiac dysfunction/coronary disease patients such as MI, coronary bypass grafting surgery, valvular surgery, balloon angioplasty, stents, angina, heart failure, dysrhythmias, implantable defibrillators and patients who may be at risk for coronary heart disease. In a prior study of the
same cardiac rehabilitation programme Denniss and Zecchin (1994) reported that the most prevalent patient group consisted of recent MI patients (45%), followed by coronary artery bypass patients and/or valvular surgery patients (44%).

There are two methods of referral into CEAP. The patients who are treated medically within the hospital system obtain referrals from their cardiologists and cardiothoracic surgical patients (with the exception of valve replacement patients) are able to self refer into the programme with the approval of the staff in the cardiac surgical unit. Appointments for assessment prior to entry into programme are made by the medical officer during the patient's stay in hospital while some appointments are made by telephone. There is no direct cost for patients as the programme is government funded under the Medicare system.

The CEAP programme is run by cardiac nursing staff under the Nursing Unit Manager. The unit has a cardiologist as the medical director. The designated nurse conducts a pre-programme clinical assessment by interviewing the patient about medical history, family history, social support, depression, anxiety and risk factors for coronary heart disease. The clinical nurse consultants with specialist training in psychology intervene when patients are extremely distressed by their condition. They make referrals to diabetes educators, social workers, physiotherapists, drug and alcohol counsellors, and psychologists. In addition, health care professionals at CEAP follow the medical contraindications for cardiac patients entering CR programmes which have been recommended by the American College of Sports Medicine (ACSM,
1995). These include any acute illness, uncontrolled arrhythmia, uncontrolled heart failure, and unstable chronic systemic disease.

3.3 Group Educational Component

During the intake process the coronary patient takes part in the educational component of CEAP which involves goal setting and planning of the rehabilitation programme through the use of verbal and/or written contracts. The nursing staff discuss patient responsibility for recovery and restoration to normal activities. Families as well as significant others are invited to actively engage in all aspects of the cardiac rehabilitation programme. As such, patients and families receive pamphlets and verbal information about the management of coronary heart disease and they are invited to attend the group component. One group session per day is open to patients' and significant others. These groups cover diet management, coping with heart disease, peer support and stress management. The group sessions run on an ongoing basis throughout the year.

3.4 Exercise Stress Test

An assessment of functional and cardiac status through the use of exercise stress testing procedures is conducted prior to entry to programme. A maximal symptom or sign limited exercise stress test is performed on a treadmill using the Bruce protocol to determine exercise training heart rate (Panza, Quyyumi, Diodati, Callahan & Epstein, 1991). When the patient exercises on the treadmill, the nursing staff monitors the functioning of the heart by an electrocardiogram which measures blood pressure, heart rate and any other irregularities such as arrhythmias. The results of the exercise stress test form the basis for the patient's exercise programme. Patients are taught to
monitor the intensity of the exercise through the use of the ratings or Borg’s scale (Borg, 1970; see measures section). The intensity of the exercise programme is based on the patients’ heart rate being maintained at a moderate level between 60% to 75% of the maximum attained during baseline testing (Goble & Worcester, 1999). Therefore, the intensity of the exercises vary according to the patients' fitness level.

3.5 Exercise Programme

Patients’ programmes consist of prescribed exercises within the hospital, home walking and the group educational component. Health care professionals instruct patients to attend the programme at least 4 times a week over a 8 week time frame during the hours of 7 am to 4 pm. The hospital programme involves the use of prescribed exercises which are conducted on the bicycle, arm ergometer, treadmill, stepper machine and rower. During the hospital programme the nursing staff use telemetry monitoring. This system enables the nursing unit staff to remotely view heart rate, ECG changes due to ischemia and heart rhythms in order to assess potential problems. In addition, the telemetry monitoring is used in conjunction with the Borg’s scale to accurately measure exercise intensity. Thus, coronary patients are taught to increase their exercise intensity through the use of the Borg’s or the perceived exertion scale and telemetry monitoring.

Patients concurrently complete a prescribed daily home walking programme to supplement the 8 week hospital programme. Patients are asked to record the date, time, type of activity, number of minutes and how they were feeling during the walking programme at home. On a weekly basis the health care professional monitors the home exercise log and he/she records changes
on the patients' medical record. Patients are required to maintain walking at the same frequency, intensity and duration or improve on the goals set at the end of the programme.

Formal assessment of the coronary patients occur at entry, middle and also upon completion of the programme. Coronary patients who adhere during the short-term are invited to be reassessed at 6, 12, 18 and 24 months from completion of the hospital programme. For these reassessments patients voluntarily attend the hospital. The same procedure as at baseline is followed for re-assessments. The health care professional suggest that the coronary patient maintains the same level of exercise and walking at home until another re-assessment is completed in the hospital at 6, 12, 18 and 24 months.

The unsupervised home walking programme after the completion of CEAP entails a minimum half hour of walking, three times a week at a moderate intensity. It is suggested that the walking become part of patients' daily routine. If individuals are able to do more walking or other forms of exercise they are encouraged to do as much as they can on a regular basis.

3.6 Informed Consent

Human subject and informed consent procedures were reviewed and approved by the University of Wollongong Human Ethics Committee and the Western Sydney Area Health Service Human Research Ethics Committee. Subjects were asked to sign a consent form and a patient information sheet was read to them prior to administration of the survey package (See Appendix 1).
3.7 Materials

3.7.1 Exercise Motivation Scale (EMI-2)

The Exercise Motivation Scale (EMI-2) was developed by Markland and Hardy (1997) to measure broad reasons for exercising (see Appendix 3). It is a 51-item self-report questionnaire which asks participants to rate their personal motives for exercising using a 6-point Likert scale from “Not at all true for me” (0) to “Very true for me” (5). The exercise participation motives were classed into the following subscales (number of items in brackets): Stress Management (4), Revitalization (3), Enjoyment (4), Challenge (4), Social Recognition (4), Affiliation (4), Competition (4), Health Pressures (3), Ill-Health Avoidance (3), Positive Health (3), Weight Management (4), Appearance (4), Strength (4) and Nimbleness (3).

The EMI-2 was used in the present study for four main reasons. Firstly, the subscales may be divided into intrinsic and extrinsic motives for exercising. The authors of the scale indicate that intrinsic motivation subscales include Enjoyment, Challenge, Revitalisation and Affiliation. These subscales conform reasonably well to the definitions of intrinsic and extrinsic motivation used by other researchers (Markland & Hardy, 1997). Extrinsic motivation encompasses the subscales of Appearance improvement, Weight Management, Health Pressures, Ill Health Avoidance, Stress Management and Social Recognition.

Secondly, the EMI-2 can be administered to individuals who are not currently exercising (Markland & Hardy, 1997). There are a number of alternative measures but a number of these are geared toward individuals who are actively exercising such as the Sport Motivation Scale (SMS), the Behavioral Regulation in Exercise Questionnaire (BREQ) and the Exercise
Motivation Index (EMI). Thirdly, the EMI-2 is simple to administer and score. Finally, the EMI-2 has good psychometric properties with support for the scale’s internal consistency with the alpha coefficients ranging from .68 to .95 (Markland & Hardy, 1993; Markland & Ingledew, 1997). The test-retest reliability coefficients ranged from .59 to .88 over a 4 to 5 week period (Markland & Hardy, 1993). The EMI-2 was found to have discriminant validity between men and women with respect to their exercise motives (Markland & Hardy, 1997). The classification matrix for the discriminant function analyses showed an overall accuracy of 83.9% with 85.1% of the males and 82.5% of the females being correctly classified.

3.7.2 Depression Anxiety Stress Scale (DASS)

Lovibond and Lovibond (1995) developed a 42 item and a 21 item scale called the Depression Anxiety Stress Scale (DASS; see Appendix 2). In the present study, the 21-item self-report questionnaire was used to assess depression, anxiety and stress. As outlined in the manual, the 21-item DASS was converted to the full-scale score by multiplying the total score by two (Lovibond & Lovibond, 1995). The main reason for using the DASS in this study was the simplicity of administration, brevity and strong psychometrics (Brown, Chorpita, Korotitsch & Barlow, 1997; Lovibond, 1998; Lovibond & Lovibond, 1995).

The DASS was used to measure the negative emotional states that were experienced over the previous week. Items are rated from “Did not apply to me at all” (0) to “Applied to me very much, or most of the time” (3). The depression subscale examined the subjects’ feelings of hopelessness, self-blame, lack of motivation, loss of pleasure and positive outlook on life. The anxiety subscale
measured situational anxiety, autonomic arousal and bodily distress. The stress subscale assessed difficulty relaxing, agitation, irritability and impatience. The DASS was constructed to assess states rather than personality traits.

Lovibond and Lovibond (1995) have found support for the scales convergent and discriminant validity. Brown, Chorpita, Korotitsch and Barlow (1997) found that the DASS had excellent internal consistency. Brown et al., (1997) used confirmatory factor analysis and found that the scale had a stable 3 factor structure over time. The alpha values for scales in the normative sample were Depression (r = 0.91); Anxiety (r = 0.84) and Stress (r = 0.90).

Moderately high intercorrelations between the three subscales have been reported as well as a close association between the stress and anxiety scale (Lovibond & Lovibond, 1995). The correlations between the subscales were: Depression-Anxiety, r = 0.51; Anxiety-Stress, r = 0.65; and Depression-Stress, r = 0.64. Lovibond and Lovibond (1995) caution that the DASS has no application to the diagnostic categories found in the Diagnostic and Statistical Manual of Mental Disorders (DSMIV, 1994).

3.8 Exercise Adherence during the Hospital Programme

3.8.1 Clinician Determined Attendance

Several measures of adherence were used in the present study. Firstly, short-term adherence was assessed by patient attendance (days attended) during the CR programme. The review of exercise adherence literature indicates that attendance is commonly used to distinguish those individuals who adhere from those who do not (Blumenthal et al., 1982; Carmody et al., 1980; Cready & Long, 1985; Fielding, 1989; Hellman 1997; Klonoff, Annechild & Landrine, 1994; Oldridge et al., 1983). The researcher asked the Nursing Unit
Manager to provide a definition of exercise adherence during the hospital programme. He estimated that patients who had attended at least 10 exercise sessions at the hospital could be classed as adherers. His estimate of adherence was based upon the assumption that patients do daily home walking as well as the hospital programme.

3.8.2 Exercise Stress Test

The Bruce protocol exercise stress test, (Panza et al., 1991) measured improvement according to (a) number of minutes and (b) metabolic equivalents (METs). The exercise stress test is routinely administered at the beginning and the end of the programme. The exercise stress test evaluates functional capacity, fitness level and it is an indicator of physical training (Zohman, 1984).

Exercise adherence according to the exercise stress test results was assessed by subtracting the (a) pre and post scores for the number of minutes; (b) the pre and post metabolic equivalent scores. The Nursing Unit Manager recommended that those patients who had increased their time on the treadmill by 2 minutes or the equivalent of 3 METs were considered to be adhering with the exercise programme. The exercise stress test results were obtained from the database that is kept by the Nursing Unit Manager at CEAP. In addition, the exercise stress test results were available only for those patients who had pre and post exercise stress test results.

3.9 Adherence at 5 month follow-up

There were a number of measures used to assess exercise adherence at 5-month follow-up as MI patients were unsupervised. The measures of exercise adherence included self-reported ratings, 7-day activity recall, and ratings of perceived exertion and qualitative reasons for discontinuing CEAP.
3.9.1 Ratings of Exercise Adherence

Participants were asked to estimate over the last 3 months in percentage terms how often they had continued their exercise routine (scores ranged from 0%-100% of the time). That is, participants were asked "How often during the last 3 months had you completed your exercise programme?" The exercise adherence rating is a single item that is used as a way of estimating participants' exercise over the last 3 months. There are a number of researchers who have used self-report adherence ratings (Hilbert, 1985; Klinger, 1984; Miller et al., 1990; Sljuis et al., 1993; Van Elderen et al., 1994). According to the research reviewed, there appears to be limited information about the reliability and validity for adherence ratings. Some researchers have validated the adherence ratings by comparing spouse ratings while other researchers validated adherence ratings by using interrater reliability (Hilbert, 1985; Miller et al., 1990). For example, researchers found that the interrater reliability was .96 and satisfactory (Hilbert, 1985). In addition, researchers found significant relationships between spouse ratings and patient ratings of compliance to diet, medication usage, physical activity, smoking and stress (Miller et al., 1990).

3.9.2 7-day Activity Recall

Another measure of exercise adherence was based upon Hellman's (1997) 7-day activity recall interview method. It is a self report measure which assess blocks of time over the last week that the patient had exercised. The 7-day activity recall method has been found to have concurrent and construct validity among older adults and cardiac rehabilitation participants (Hellman, Williams & Thalken, 1997).
During the 3-6 month follow-up period participants were asked to describe their exercise activities over the past week. This short time frame was used to reduce the potential effects of memory problems or artifacts. Participants were also asked to indicate whether the past week had been “typical” for them with regard to their exercise routines. The patients were asked to describe the type of exercise, and number of minutes per exercise session.

3.9.3 Reasons for Discontinuation from CEAP

Consistent with the method of Oldridge (1995; See Appendix 9), reasons for discontinuation within the CEAP programme were classified into two categories which were avoidable and unavoidable reasons (Oldridge, 1995). This method of qualitative classification was used in other research to distinguish between those who adhere and those who do not adhere to their programme (Oldridge et al., 1983; Oldridge & Streiner, 1989). Avoidable reasons included factors such as lack of interest and motivation, prescription difficulties, lack of contact, programme inconvenience, family and work commitments. Unavoidable reasons were classed as moving away from the area and medical reasons. When CEAP staff contacted patients on at least 3 occasions for appointments with no response then “lack of contact” is recorded in their medical file. The nursing staff writes the patients reasons for leaving CEAP in the hospital’s database and medical record. In the present study, the researcher categorised these responses according to Oldridge’s (1995) list of avoidable and unavoidable definitions (See Appendix 9).

3.10 Measurement of Exercise Intensity

Exercise intensity was measured for a number of reasons. Firstly, exercise needs to be at moderate intensity for conditioning of the heart and to
produce the associated health benefits (ACSM, 1995). The recommended amount of exercise to improve cardiovascular fitness is at least thirty minutes, 3 times a week at a moderate intensity (Paffenbarger, Wing & Hyde, 1978; ACSM, 1995). Secondly, it was necessary to classify physical activity according to types of moderate exercise in order to determine whether MI patients were following the programme at follow-up. Moderate exercise refers to physical activity that is rhythmic, aerobic and it increases oxygen consumption within the body. As noted previously, it includes exercises such as constant walking, hiking, jogging, machine-based stair climbing, rowing, combined arm and leg ergometry, dancing, skating, endurance game activities, aerobic workouts, dancing, rope skipping, cycling or swimming (ACSM, 1995). For the purpose of the present study other forms of exercise such as golf and strength exercise machines have been included as they have been classed as being of moderate intensity in prior studies (Pate et al., 1995).

The American College of Sport Medicine (ACSM, 1995) recommends a minimum of 30 minutes of continuous aerobic activity 3 times a week to achieve cardiorespiratory endurance. Thus, in the present study, adherers were classed as patients who had completed at least 90 minutes or more of either walking or any other aerobic activity over the last week at a moderate intensity.

3.10.1 Ratings of Perceived Exertion (RPE)

During the telephone interviews patients were asked to describe in their own words their feelings during exercising. In addition, they were asked “How hard are you working?” and to give a rating according to the Borg’s scale which they had been taught in the CEAP hospital programme (RPE; Borg, 1970). The scale is a 0-10 or 11 point self-report rating, which ranges from “rest” (0) to
A rating of perceived exertion of 1-2 “light” is equal to low intensity exercise while a rating of 3 is equal to moderate intensity. High intensity is rated at 7-10 and corresponds with “very strong to maximal”. The Borg's rating (RPE; Borg, 1970) has been found to be a reliable marker of an individual's exercise tolerance and it was significantly correlated with exercise heart rate and oxygen consumption values (Noble, Borg, Jacobs, Ceci & Kaiser, 1983). During the follow-up telephone interviews the Borg's scale was repeated during the recall of the last 7-days of exercise. Patients were asked to describe the exercise intensity for the session in their own words and then they were asked to give a rating from the Borg’s scale (RPE) to estimate how hard they were working.

3.11 Procedures

An instructional sheet was designed to provide the nursing staff with procedures for data collection (see Appendix 8). The instructional sheet included eligibility criteria for the selection of patients and highlighted the strict confidentiality of the patients' responses. The Nursing Unit Manager advised his staff about the protocols for the study. Packages of self-administered questionnaires included a statement of informed consent, a patient information sheet, a measure of demographic variables, a measure of Depression, Anxiety, Stress and Exercise Motivation (see copies of the measures in Appendix 2 and 3). The final page of the survey package contained a consent form for the follow-up structured interviews.

The Nursing Unit Manager and selected nursing staff informed subjects that the study was voluntary and that all participants would receive a code number when completing the survey package to maintain confidentiality. Those
explained to them and they were informed that they could withdraw from the study at any time. The completed survey packages were sent to the researcher with the date of entry into the programme.

Five individuals (4 males and 1 female) were interviewed over the telephone as part of a pilot for the structured interviews. The participants were asked to evaluate the interview questions and to provide feedback related to the vocabulary and other deficiencies in the procedure. The participants that were interviewed suggested that the interview took a longer time than was anticipated by the researcher. On the basis of the feedback, the structured interviews were refined by excluding several qualitative questions from the research protocol (e.g., questions regarding pain, benefits of exercise, social support). In addition the adherence ratings question was rephrased, as it was difficult to understand in the original context.

The follow-up data collection entailed telephone interviews, which commenced in September 1998 and were completed by May 1999. The interviews were conducted between 3 and 6 months from completion of the outpatient programme. The structured interview entailed participant consent to re-administer the EMI-2 and the DASS. In addition, other questions that were asked during the interview referred to: 1) exercise prescription after the hospital programme, 2) the way the exercise programme was monitored, 3) whether the MI patient was following the programme, 4) rating of exercise adherence, 5) different forms of exercise, 6) the reasons the participants did or did not exercise, 7) the typical weekly amounts of exercise, 8) Borg's scale ratings of exercise intensity, 9) comments or feedback for the researcher (see Appendix 5)
Chapter 4: Results

4.1 Overview of the Analysis

There were seven stages in the present analysis:

1) sampling and data screening issues were examined. Descriptive comparisons (e.g. means, standard deviations) with the original MI sample \( (n = 50) \) to the follow-up sample \( (n = 38) \) at Time 1 for exercise motivation (EMI-2), psychological distress (DASS) and exercise adherence (attendance) were conducted. Assessment of reliability was calculated for the DASS and EMI-2.

2) comparisons between the MI sample and healthy samples were made for EMI-2 and DASS to determine differences between groups. Also, independent t-tests were used to examine differences between the Australian MI sample and a healthy adult sample for the EMI-2 and DASS. A UK healthy sample was used as a normative comparison group for the EMI-2 (Markland & Hardy, 1997). A Australian healthy sample was used as a normative comparison group for the DASS (Lovibond & Lovibond, 1995).

3) pre and post comparisons (Time 1 and Time 2) in mean scores for EMI-2, DASS, intrinsic, extrinsic motivation and exercise adherence were examined. DASS and EMI-2 were tested using paired sample t-tests to test significant differences between Time 1 and Time 2.

4) rates of adherence (percentages) using varying definitions within the CEAP programme were examined. In addition, the avoidable and unavoidable reasons for discontinuing CEAP were presented.

5) Pearson’s correlation coefficients were used to examine the relationship among DASS, intrinsic, extrinsic motivation and exercise adherence (attendance, minutes of exercise, patient self-estimates) at entry and follow-up.
Also, chi-square analyses were conducted to examine whether the same proportion of MI patients adhered at Time 1 and at Time 2.

6) MANOVA was used to examine the main and interaction effects between adherence, EMI-2 and DASS over time.

7) multiple regression analyses were conducted to examine the extent to which intrinsic, extrinsic motivation and DASS were able to predict exercise adherence (attendance, minutes of exercise and patient self-estimates).

The statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS for Windows 6.1). An alpha level of .05 was used for all statistical tests. Prior to the analysis, inspection of univariate descriptive statistics revealed no extreme outliers. For the MANOVA there were no univariate or multivariate within-cell outliers. Results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory.

4.2 Dealing with Missing Data and Data Screening

In line with Tabachnick and Fidell (1996) the missing values for the DASS and the EMI-2 at Time 1 were replaced by the item means for all cases. There were four participants with missing data for the DASS and five participants with missing data within the EMI-2 at Time 1. There was no missing data for the DASS and EMI-2 at five-month follow-up.

4.3 Sampling Issues

In the present study, because 38 out of the original 50 MI patients completed the follow-up study, descriptive comparisons were made to assess similarities or differences between samples to rule out sampling bias. Aspects
of the analyses, which explore sampling issues also, provide a description of the sample at Time 1 compared to the sample at Time 2.

### 4.4 Types of Exercise Motivation

The mean scores for the total MI patient sample (n = 50) and the mean scores for MI patients who completed the study at Time 1 and the follow-up sample scores at Time 1 (n = 38) are presented in Table 4.1. The three strongest motivations for exercise for this group of MI patients at Time 1 were health related. That is, MI patients exercised due to wanting to be free from illness, maintaining good health and recovering from the effects of coronary heart disease. Motives that were of lesser importance for MI patients were enjoyment and exercising to meet with friends. Table 4.1 indicates that there was unlikely to be “attrition bias” for the follow-up sample because there was very little change in exercise motivation ordering for the full and follow-up sample. Also, there appears to be a slight increase in exercise motivations for the follow-up sample at Time 1 with differences in mean scores for the Nimbleness, Revitalization, Appearance and Affiliation variables.
Table 4.1

Means and standard deviations for the EMI-2 at Entry.

<table>
<thead>
<tr>
<th>Exercise Motivation Inventory-2 (EMI-2)</th>
<th>Entry / Time 1</th>
<th>Full sample (n = 50)</th>
<th>Follow-up sample (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Ill Health</td>
<td>1</td>
<td>4.34</td>
<td>1.16</td>
</tr>
<tr>
<td>Positive Health</td>
<td>2</td>
<td>4.01</td>
<td>1.24</td>
</tr>
<tr>
<td>Health Pressures</td>
<td>3</td>
<td>3.78</td>
<td>1.56</td>
</tr>
<tr>
<td>Strength</td>
<td>4</td>
<td>3.11</td>
<td>1.37</td>
</tr>
<tr>
<td>Weight Management</td>
<td>5</td>
<td>3.02</td>
<td>2.03</td>
</tr>
<tr>
<td>Revitalisation</td>
<td>6</td>
<td>2.79</td>
<td>1.52</td>
</tr>
<tr>
<td>Nimbleness</td>
<td>7</td>
<td>2.74</td>
<td>1.75</td>
</tr>
<tr>
<td>Stress Management</td>
<td>8</td>
<td>2.55</td>
<td>1.70</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>9</td>
<td>2.35</td>
<td>1.78</td>
</tr>
<tr>
<td>Challenge</td>
<td>10</td>
<td>1.71</td>
<td>1.59</td>
</tr>
<tr>
<td>Appearance</td>
<td>11</td>
<td>1.69</td>
<td>1.52</td>
</tr>
<tr>
<td>Affiliation</td>
<td>12</td>
<td>1.31</td>
<td>1.55</td>
</tr>
<tr>
<td>Competition</td>
<td>13</td>
<td>1.25</td>
<td>1.62</td>
</tr>
<tr>
<td>Social Recognition</td>
<td>14</td>
<td>1.02</td>
<td>1.46</td>
</tr>
</tbody>
</table>

Table 4.2 indicates that for the follow-up sample at Time 1 intrinsic and extrinsic motivations were slightly lower than the total sample motivations at Time 1.
Table 4.2

Means and standard deviations for intrinsic and extrinsic motivation at entry and follow-up

<table>
<thead>
<tr>
<th>Measure of motivation</th>
<th>Time 1 (n = 50)</th>
<th>Time 1 (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>2.16</td>
<td>1.37</td>
</tr>
<tr>
<td>Extrinsic motivation</td>
<td>2.60</td>
<td>.97</td>
</tr>
</tbody>
</table>

4.5 Psychological Distress

At a descriptive level, Table 4.3 indicates that those who completed the follow-up appeared to be slightly more psychologically distressed than the total sample at Time 1.

Table 4.3

Means and standard deviations for the DASS at Entry.

<table>
<thead>
<tr>
<th></th>
<th>Total sample</th>
<th>Patients at follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time 1 (n = 50)</td>
<td>Time 1 (n = 38)</td>
</tr>
<tr>
<td>DASS</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Stress</td>
<td>10.84</td>
<td>10.34</td>
</tr>
<tr>
<td>Anxiety</td>
<td>7.96</td>
<td>8.67</td>
</tr>
<tr>
<td>Depression</td>
<td>7.70</td>
<td>9.68</td>
</tr>
</tbody>
</table>

4.6 Exercise Adherence

Table 4.4 indicates that the follow-up sample were similar to the original MI sample with 46% and 55% adhering to CEAP according to exercise test results. In addition, the follow-up sample was similar to the original sample with 40% and 50% adhering to CEAP according to number of sessions.
Table 4.4

Exercise Adherence for MI sample at entry

<table>
<thead>
<tr>
<th>Adherence Measures at Entry</th>
<th>Time 1 (n = 50)</th>
<th>Time 1 (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Attendance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre &amp; post programme</td>
<td>23/50</td>
<td>46</td>
</tr>
<tr>
<td>exercise stress test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 10 sessions</td>
<td>20/50</td>
<td>40</td>
</tr>
</tbody>
</table>

These results indicate that those participants who completed the follow-up were similar to the total sample overall with regard to the order and strength of various components of exercise motivations (Table 4.1). They tended to be slightly lower in both intrinsic and extrinsic motivation compared to the total sample and showed slightly higher levels of psychological distress. However, at a descriptive level these differences were small and unlikely to affect pre-post test comparisons due to any sampling bias.

4.7 Comparisons between MI and healthy samples

Because there appears to be little research about exercise motivation for MI patients undergoing cardiac rehabilitation, the present study extends previous research by comparing the MI sample with a UK sample of healthy “civil servants” in Table 4.5 (Markland & Ingledew, 1997). The main reasons for exercising in the healthy sample were Positive Health, Ill health, Weight Management, Nimbleness while Health Pressures were lower in importance. For the MI sample, the main reasons for exercising were Ill health, Positive Health, Health Pressures and Strength. Social recognition as a motive for exercising appeared to not be a high priority for exercising in both the UK and
Table 4.5

Means, standard deviations for the EMI-2 for the MI and healthy UK sample

<table>
<thead>
<tr>
<th>Exercise Motivation Inventory-2 (EMI-2)</th>
<th>MI sample Time 1 (n = 50)</th>
<th>UK healthy sample (Markland &amp; Ingledew, 1997)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Positive Health</td>
<td>4.01</td>
<td>1.24</td>
</tr>
<tr>
<td>Ill Health</td>
<td>4.34</td>
<td>1.16</td>
</tr>
<tr>
<td>Weight Management</td>
<td>3.02</td>
<td>2.03</td>
</tr>
<tr>
<td>Nimbleness</td>
<td>2.74</td>
<td>1.75</td>
</tr>
<tr>
<td>Revitalisation</td>
<td>2.79</td>
<td>1.52</td>
</tr>
<tr>
<td>Strength</td>
<td>3.11</td>
<td>1.37</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>2.35</td>
<td>1.78</td>
</tr>
<tr>
<td>Stress Management</td>
<td>2.55</td>
<td>1.70</td>
</tr>
<tr>
<td>Appearance</td>
<td>1.69</td>
<td>1.52</td>
</tr>
<tr>
<td>Affiliation</td>
<td>1.31</td>
<td>1.55</td>
</tr>
<tr>
<td>Challenge</td>
<td>1.71</td>
<td>1.59</td>
</tr>
<tr>
<td>Competition</td>
<td>1.25</td>
<td>1.62</td>
</tr>
<tr>
<td>Health Pressures</td>
<td>3.78</td>
<td>1.56</td>
</tr>
<tr>
<td>Social Recognition</td>
<td>1.02</td>
<td>1.46</td>
</tr>
</tbody>
</table>

To determine differences between exercise motivations for the UK sample (n = 425) and the Australian MI sample (n = 50) independent groups t-tests were performed. Given multiple comparisons and to reduce the risk of Type 1 error a Bonferroni adjusted alpha of p<.004 was used. The following exercise motivations for both samples were found to be statistically significant:
1) ill health, $t(473) = 7.04, p < .000$, 2) health pressures, $t(473) = 14.65, p < .000$, 3) strength, $t(473) = 3.56, p < .000$. Consistent with the relative order and strength within the MI sample, the results of the comparison with a healthy sample confirmed that Ill Health, Health Pressures and Strength were significantly higher exercise motivations for the MI sample than in the healthy comparison sample.

The DASS mean scores for MI patients were compared with the normal Australian sample mean scores (Lovibond & Lovibond, 1995). Table 4.6 indicates that the mean scores for the normal Australian sample for stress, anxiety and depression were lower than the mean scores for the MI sample. At a descriptive level MI patients appeared to be more psychologically distressed than the normal sample.

Table 4.6

Means and standard deviations for the DASS in MI sample and healthy Australian sample

<table>
<thead>
<tr>
<th>Measure</th>
<th>MI sample</th>
<th></th>
<th>Healthy sample</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time 1 (n = 50)</td>
<td></td>
<td>(n = 2914)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DASS</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>alpha</td>
</tr>
<tr>
<td>Stress</td>
<td>10.84</td>
<td>10.34</td>
<td>10.11</td>
<td>7.91</td>
<td>.90</td>
</tr>
<tr>
<td>Anxiety</td>
<td>7.96</td>
<td>8.67</td>
<td>4.70</td>
<td>4.91</td>
<td>.84</td>
</tr>
<tr>
<td>Depression</td>
<td>7.70</td>
<td>9.68</td>
<td>6.34</td>
<td>6.97</td>
<td>.91</td>
</tr>
</tbody>
</table>

To determine whether there were statistical differences between the normal Australian sample (n = 2914) and the MI sample (n = 50) on the DASS, independent groups t-tests were performed. Significant differences were found for the anxiety subscale: 1) anxiety $t(2962) = 4.58, p < .008$. A Bonferroni
adjustment, of $p < .016$ was used. The mean anxiety scores for the MI sample were higher than the mean scores for the normal Australian sample.

4.8 Pre and Post Changes in Exercise Motivation

Table 4.7 displays health related motivations were still highest at 5 month follow-up. That is, at a descriptive level III Health, Positive Health, Strength and Health Pressures were the most important reasons the MI patients exercised at entry and again at follow-up. Revitalization, Stress Management changed relative order and became relatively higher motivational components of exercise. Revitalization, Enjoyment, Stress Management and Competition motives for exercise increased from Time 1 to Time 2. Affiliation as a motive for exercise decreased in importance from Time 1.

Paired sample t-tests revealed that there were significant differences between stress management from Time 1 and Time 2, $t(37) = -8.00, p < .000$, indicating that stress management as a reason for exercising increased over time. There were non-significant differences between Time 1 and Time 2 for the various other EMI-2 subscales.
Table 4.7

Pre and post changes in Means, standard deviations for the EMI-2 at Entry and follow-up

<table>
<thead>
<tr>
<th>Exercise Motivation Inventory-2 (EMI-2)</th>
<th>Time 1 (n = 38)</th>
<th>Time 2 (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rank</td>
<td>M</td>
</tr>
<tr>
<td>Ill Health</td>
<td>1</td>
<td>4.34</td>
</tr>
<tr>
<td>Positive Health</td>
<td>2</td>
<td>4.14</td>
</tr>
<tr>
<td>Health Pressures</td>
<td>3</td>
<td>3.82</td>
</tr>
<tr>
<td>Strength</td>
<td>4</td>
<td>3.21</td>
</tr>
<tr>
<td>Nimbleness</td>
<td>6</td>
<td>2.82</td>
</tr>
<tr>
<td>Revitalization</td>
<td>7</td>
<td>2.81</td>
</tr>
<tr>
<td>Weight Management</td>
<td>5</td>
<td>3.20</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>9</td>
<td>2.34</td>
</tr>
<tr>
<td>Stress Management</td>
<td>8</td>
<td>2.54</td>
</tr>
<tr>
<td>Challenge</td>
<td>10</td>
<td>1.81</td>
</tr>
<tr>
<td>Competition</td>
<td>13</td>
<td>1.29</td>
</tr>
<tr>
<td>Appearance</td>
<td>12</td>
<td>1.72</td>
</tr>
<tr>
<td>Affiliation</td>
<td>11</td>
<td>1.74</td>
</tr>
<tr>
<td>Social Recognition</td>
<td>14</td>
<td>1.03</td>
</tr>
</tbody>
</table>

4.9 Pre and post changes in Psychological Distress

Table 4.8 indicates that the mean scores of depression, anxiety and stress decreased from Time 1 to Time 2. However, paired sample t-test revealed that there were non-statistically significant differences between depression, anxiety and stress from Time 1 to Time 2.
Table 4.8

Means, standard deviations and reliability for DASS in MI sample at Follow-up

<table>
<thead>
<tr>
<th>DASS</th>
<th>Time 1 (n = 38)</th>
<th></th>
<th>Time 2 (n = 38)</th>
<th></th>
<th></th>
<th></th>
<th>alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>11.55</td>
<td>10.90</td>
<td>10.68</td>
<td>12.76</td>
<td>.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>8.04</td>
<td>9.36</td>
<td>7.32</td>
<td>9.51</td>
<td>.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>7.80</td>
<td>10.15</td>
<td>7.26</td>
<td>10.10</td>
<td>.92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.10 Pre and Post Changes in Intrinsic and Extrinsic Motivation

At a descriptive level, intrinsic and extrinsic motivation means decreased (See Table 4.9). At a descriptive level, it appears that MI patients became less intrinsically and extrinsically motivated over time. Overall, it appeared that extrinsic motivations were stronger than intrinsic motivations. Paired sample t-tests revealed that there were non significant differences between intrinsic motivation, $t(37) = -1.28, p > .21$ and extrinsic motivation from Time 1 and Time 2, $t(37) = -0.66 = p > .51$. Internal reliability for intrinsic and extrinsic motivation was satisfactory and alpha coefficients ranged from .71-.79.

Table 4.9

Means and standard deviations for intrinsic and extrinsic motivation at Entry and Follow-up

<table>
<thead>
<tr>
<th>Measures of motivation</th>
<th>Time 1 (n = 38)</th>
<th></th>
<th>Time 2 (n = 38)</th>
<th></th>
<th></th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>1.85</td>
<td>1.54</td>
<td>1.80</td>
<td>1.44</td>
<td>.79</td>
<td></td>
</tr>
<tr>
<td>Extrinsic motivation</td>
<td>2.49</td>
<td>1.13</td>
<td>2.45</td>
<td>1.10</td>
<td>.71</td>
<td></td>
</tr>
</tbody>
</table>
To further investigate significant increases in levels of intrinsic motivation and exercise adherence during the unsupervised segment at 5 months follow-up, paired sample t-tests were conducted. The results revealed that for MI patients who adhered (> 90 minutes) to exercise therapy during the unsupervised segment, there was a non-significant change in intrinsic motivation for exercise between Time 1 and Time 2, \( t(26) = -2.57, \text{n.s.} \). To determine whether levels of extrinsic motivation differed across time, paired sample t-tests were used. The results of those comparisons revealed that for MI patients who adhered (> 10 sessions) to CEAP, there was a non-significant change in extrinsic motivation between Time 1 and Time 2, \( t(17) = -.44, \text{n.s.} \).

### 4.11 Pre and post changes in Exercise Adherence

In order to examine the relationship between rates of exercise adherence within the hospital programme and at follow-up, Pearson’s correlation were conducted. There was a moderate positive and significant relationship between the number of exercise sessions at CEAP and patient self-estimates of adherence at follow-up \( r(38) = .33, p < .05 \). Similarly, there was a positive and significant relationship between the number of exercise sessions at CEAP and the number of minutes of exercise at follow-up using the 7-day activity recall \( r(38) = .35, p < .05 \).

To determine whether there was a different proportion of patients who adhered at Time 1 (> 10 sessions) who also adhered at follow-up (> 90 mins/week) chi-square test was used (see Table 4.10). No significant difference was found between those who adhered at Time 1 and at follow-up, \( X^2(1, N = 38) = 3.20, p > 0.05 \), indicating that attendance (> 10 sessions) within CEAP
appears to be independent of exercise adherence (> 90 mins/week) at follow-up.

Table 4.10 Chi-square assessing independence between number of sessions and later exercise adherence at follow-up

<table>
<thead>
<tr>
<th>Adherence</th>
<th>&gt; 10 sessions</th>
<th>&lt; 10 sessions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 90 mins/week of exercise</td>
<td>16</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>&lt; 90 mins/week of exercise</td>
<td>3</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>19</td>
<td>38</td>
</tr>
</tbody>
</table>

4.12 Rates of Exercise Adherence

One of the main aims of the present study was to examine the varying rates of exercise adherence for MI patients attending the Cardiac Assessment and Education Programme (CEAP). In order to classify the patients, who adhered and did not adhere to the hospital programme, attendance and performance measures were taken into account. The MI patients who completed the pre and post exercise stress test, attended at least 10 sessions within CEAP, and improved their performance by 2 minutes or 3 METs were considered to have adhered to the exercise programme (See Table 4.11). METs refer to the energy expended for a given physical activity as measured by the exercise stress test. Attendance during CEAP was used for the present study as the main definition of exercise adherence during the supervised part of CR. Likewise, adherence rates at 5 months follow-up were assessed by the 7 day-activity recall method and percentage patient self-report estimates of adherence. In the present study, exercise adherence at 5 month follow-up was
defined as the completion of at least 90 minutes of walking or other aerobic activity (See Table 4.13).

As the results in Table 4.11 indicate, there was a 46% and 40% adherence rate for this group of MI patients, according to the attendance measures. This implies that 60% did not complete the programme according to attendance indicators. Performance measures using the exercise stress test revealed that of those individuals who did complete the hospital programme, a high proportion (91% and 65%) obtained functional improvement.

Table 4.11

Varying measures of adherence for the Cardiac Education Assessment Programme (CEAP)

<table>
<thead>
<tr>
<th>Definitions of adherence</th>
<th>Short-term adherence measures</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>Completed pre &amp; post programme exercise stress test</td>
<td>23/50</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>≥ 10 sessions</td>
<td>20/50</td>
<td>40</td>
</tr>
<tr>
<td>Performance</td>
<td>≥ 2 minute improvement in stress test</td>
<td>21/23</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>≥ 3 MET improvement for stress test</td>
<td>15/23</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 4.12 indicates that a majority of MI patients (30%) discontinued CEAP due to medical reasons. Other unavoidable reasons that MI patients left CEAP consisted of travel and medical (34%). In addition, avoidable reasons for leaving CEAP were lack of interest, work and family commitments (20%).
### Table 4.12

**Avoidable and unavoidable reasons for not completing CEAP**

<table>
<thead>
<tr>
<th>Reasons for not completing CEAP</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel distance, lives in Orange</td>
<td>2/50</td>
<td>4</td>
</tr>
<tr>
<td>Lack of interest</td>
<td>3/50</td>
<td>6</td>
</tr>
<tr>
<td>Medical reasons</td>
<td>15/50</td>
<td>30</td>
</tr>
<tr>
<td>Work commitments</td>
<td>3/50</td>
<td>6</td>
</tr>
<tr>
<td>Lack of contact</td>
<td>3/50</td>
<td>6</td>
</tr>
<tr>
<td>Family commitments</td>
<td>1/50</td>
<td>2</td>
</tr>
<tr>
<td><strong>Did not complete CEAP</strong></td>
<td>27/50</td>
<td>54</td>
</tr>
<tr>
<td><strong>Completed CEAP</strong></td>
<td>23/50</td>
<td>46</td>
</tr>
</tbody>
</table>

Table 4.13 shows 47% (18/38) of participants who completed the hospital programme were exercising according to CEAP prescription (> 90 minutes of moderate activity/week). It should be noted that 24% (9/38) of the sample were moderately exercising even though they had not completed the hospital programme. For those individuals who completed the follow-up interviews, adherence to exercise routines was good with 71% exercising moderately at 5 months and 66% walking every day. Patient mean self-estimates of exercise adherence were lower on average than actual 7-day activity recall rates.
Table 4.13

Exercise adherence at 5 month follow-up

<table>
<thead>
<tr>
<th>Definitions of adherence</th>
<th>Follow-up adherence measures</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-report</td>
<td>Patient mean % estimate of adherence</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>7-day activity recall</td>
<td>≥ 90 minutes of walking &amp; equivalent aerobic activity and completed CEAP</td>
<td>18/38</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>≥ 90 minutes of walking &amp; equivalent aerobic activity e.g., aerowalker, treadmill, bicycle riding, exercise bike, lawn bowls, tennis, swimming, gym &amp; golf (CEAP Westmead)</td>
<td>27/38</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>≥ 140 minutes of walking</td>
<td>25/38</td>
<td>66</td>
</tr>
</tbody>
</table>

4.13 Relationship between Intrinsic, Extrinsic Motivation and Exercise Adherence

Pearson’s correlation were conducted to determine the relationship between intrinsic, extrinsic motivation and exercise adherence. Contrary to Cognitive Evaluation Theory, there was no significant relationship between intrinsic motivation and exercise adherence (minutes of exercise) at follow-up, $r (38) = .07, p > .05$. Also, there was no significant relationship between extrinsic motivation and exercise adherence (no. of sessions at CEAP) during the supervised segment, $r (38) = -.21, p > .05$.

It was hypothesised that MI patients who adhered at follow-up would be intrinsically motivated while those MI patients who did not adhere at follow-up would be more likely to be extrinsically motivated. Independent samples t-test was conducted to compare levels of intrinsic and extrinsic motivation between adherers and nonadherers during the unsupervised part of CR (< 90 minutes
and > 90 minutes). Results found there was no significant differences between adherers and nonadherers for intrinsic motivation, \( t (36) = 1.07, p > .05 \). Results indicated that there was no significant difference between adherers and nonadherers on extrinsic motivation, \( t (36) = .12, p > .05 \), indicating that nonadherers were not more likely to be extrinsically motivated.

### 4.14 Relationship between Psychological Distress and Exercise Adherence

It was expected that psychological distress and exercise motivation would be related to exercise adherence. The total DASS score and subscales were examined to assess whether they were related to various measures of exercise adherence (attendance, patient self-estimates of adherence and minutes of exercise at follow-up).

Table 4.14 indicates, there was a negative significant relationship between patient self-estimates of adherence and anxiety, \( r (38) = -.34, p < .05 \). In addition, the relationship between stress and self-estimated adherence approached significance, \( r (38) = -.32, p > .06 \). The relationship between depression and exercise adherence approached significance, \( r (38) = -.33, p > .08 \). It appears that higher levels of anxiety were associated with lower levels of exercise adherence.
Table 4.14

**Correlations between psychological distress and exercise adherence at Entry and Follow-up.**

<table>
<thead>
<tr>
<th>Measure of Psychological distress</th>
<th>Time 1 (n = 50)</th>
<th>Time 2 (n = 38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No of sessions in CEAP&lt;sub&gt;1&lt;/sub&gt;</td>
<td>% self-estimates&lt;sub&gt;2&lt;/sub&gt;</td>
</tr>
<tr>
<td>Total DASS Time 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>-0.01</td>
<td>-0.22</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.12</td>
<td>-0.09</td>
</tr>
<tr>
<td>Stress</td>
<td>0.12</td>
<td>-0.32</td>
</tr>
<tr>
<td>Total DASS Time 2</td>
<td>0.14</td>
<td>-0.33</td>
</tr>
<tr>
<td>Depression</td>
<td>0.18</td>
<td>-0.31</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.11</td>
<td>-0.34*</td>
</tr>
<tr>
<td>Stress</td>
<td>0.10</td>
<td>-0.32</td>
</tr>
</tbody>
</table>

*<sup>p</sup>%<sub>.05 two tailed</sup>

**Note.** 1 = "No of sessions in CEAP" were the number of times the patient attended CEAP hospital programme.

2 = "% self estimates" were the patient ratings of compliance at follow-up as a percentage.

3 = "Minutes of exercise at follow-up" were the number of minutes of exercise that each patient carried out during a 7 day activity recall 5 months after the end of the hospital programme.

**4.15 Exercise Adherence, Motivation and Psychological Distress**

A 2 x 2 multivariate analysis of variance (MANOVA) was performed to examine the effects of Adherence (number of sessions & minutes of exercise at follow-up) across Time on the subscales of the EMI-2. The MANOVA results
indicated that there was no significant main effect for Time, Wilks Lambda = F (14, 23) = .988, \( p = .494 \), adherence Wilks' Lambda = .698, F (14, 23) = .711, \( p = .743 \) and the interaction effect between Time and adherence, Wilks Lambda = F (14, 23) = 1.69, \( p = .127 \).

A 2 x 2 MANOVA was used to examine the effects of Adherence (number of sessions & minutes of exercise at follow-up) across Time and the subscales of psychological distress (DASS). The MANOVA results indicated that there was no significant main effect for Time, Wilks' Lambda = .976, F (3,34) = .282, \( p = .838 \), Adherence Wilks' Lambda = .989, F (3, 34) = .131, \( p = .941 \), and the interaction effect between Time and Adherence, Wilks' Lambda = .923, F (3, 34) = .948, \( p = .428 \).

4.16 Intrinsic, Extrinsic Motivation, Psychological distress as Predictors of Exercise Adherence

Three standard multiple regressions were performed to examine whether motivation and psychological distress predicted exercise adherence. Intrinsic/extrinsic motivation and psychological distress were the independent variables and exercise adherence (attendance, patient self-estimates and minutes of exercise at follow-up) were the dependent variables. Table 4.15 displays the extent psychological distress and exercise motivation predicted exercise adherence, the unstandardised regression coefficients (Beta) and intercept, the standardised regression coefficients (B) and levels of significance. Table 4.15 indicates that the variables psychological distress and intrinsic/extrinsic motivation were non significant predictors of adherence, F (3, 36) = 1.01, \( p >.05 \).
Table 4.15

**Regression analysis between exercise motivation, psychological distress and attendance at Entry**

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Dependant Variable</th>
<th>B</th>
<th>Beta</th>
<th>t</th>
<th>R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.08</td>
</tr>
<tr>
<td>Intrinsic</td>
<td></td>
<td>-3.63</td>
<td>-.49</td>
<td>-1.67</td>
<td></td>
</tr>
<tr>
<td>Extrinsic</td>
<td></td>
<td>4.15</td>
<td>.43</td>
<td>1.44</td>
<td></td>
</tr>
<tr>
<td>DASS Total</td>
<td></td>
<td>.76</td>
<td>.05</td>
<td>.28</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Table 4.16 shows multiple regression analyses that were conducted on the dependant variables of intrinsic/extrinsic motivation, psychological distress and adherence as measured by total minutes of exercise at follow-up. The regression model including intrinsic/extrinsic motivation and psychological distress at Time 2 did not significantly predict minutes of exercise at follow-up, F (3, 36) = .48, p >.05, and only accounted for 5% of the variance.

Table 4.16

**Regression analysis between exercise motivation, psychological distress and minutes of exercise at follow-up**

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Dependant Variable</th>
<th>B</th>
<th>Beta</th>
<th>t</th>
<th>R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minutes of exercise</td>
<td>12.77</td>
<td>.102</td>
<td>.38</td>
<td>.05</td>
</tr>
<tr>
<td>Intrinsic</td>
<td></td>
<td>12.29</td>
<td>.074</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>Extrinsic</td>
<td></td>
<td>-38.66</td>
<td>-.18</td>
<td>-.97</td>
<td></td>
</tr>
</tbody>
</table>

*p<.05
Table 4.17 shows that the model using psychological distress and intrinsic/extrinsic motivation to predict patient self-estimates of adherence was found to be non significant, $F (3, 30) = 2.02, p >.05$, and only accounted for 17% of the variance.

**Table 4.17**

**Regression analysis between exercise motivation, psychological distress and % patient self estimates at follow-up**

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Dependant Variable</th>
<th>B</th>
<th>Beta</th>
<th>t</th>
<th>R</th>
<th>Square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% patient self estimates</td>
<td>6.45</td>
<td>.24</td>
<td>.99</td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td>Intrinsic</td>
<td></td>
<td>-9.13</td>
<td>-.27</td>
<td>-1.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extrinsic</td>
<td></td>
<td>-15.89</td>
<td>-.37</td>
<td>-2.14*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p<.05$

Overall, intrinsic, extrinsic motivation and psychological distress were not found to be useful as predictors of exercise adherence and these findings are contrary to Cognitive evaluation theory principles.
Chapter 5: Discussion

Most MI patients who survive a coronary episode need to make long-term lifestyle adjustments and exercise regularly in order to help reverse the effects of coronary heart disease. One of the main concerns for clinicians working with survivors of myocardial infarction (MI) are the poor adherence rates shown by these patients during both the supervised and unsupervised segments of cardiac rehabilitation (CR). The present study examined the effectiveness of the Cardiac Education and Assessment Programme (CEAP) in helping MI patients to follow an exercise programme. Effectiveness was determined by assessing exercise adherence over time using a number of measures. The study also examined the extent to which exercise motivation and psychological distress predict adherence to exercise therapy within the theoretical framework of Cognitive Evaluation Theory.

5.1 Rates of Exercise Adherence during Hospital Programme

One of the main aims of the present study was to examine the effectiveness of the CR treatment within the hospital and at follow-up. Results indicated an adherence rate between 46% and 40% within the hospital programme dependant on the measure of attendance used. Ninety-one percent of those MI patients who completed the Cardiac Education and Assessment Programme (CEAP), obtained functional improvement by the end of the programme according to exercise test results (i.e. 2 minute improvement). These findings suggest that CEAP was effective for those MI patients who adhered to the programme.

Results indicated that there was a high proportion of coronary patients who discontinued CEAP (60%) at entry. The findings suggest that rates of
exercise non-adherence for the MI sample in the present study were higher than one review of randomised CR trials, where the rate of dropout was between 2-25% at 3 months (Bittner & Oberman, 1993). In the present study, the majority of MI patients (34%) discontinued the hospital programme due to unavoidable reasons such as medical and travel. Avoidable factors accounted for 20% of the reasons for discontinuation and included, lack of interest, work and family commitments. This finding suggests that clinicians at CEAP may be able to address some of the avoidable factors at entry to overcome barriers to treatment. Barriers found by other researchers which were thought to influence adherence rates at entry include, poor doctor referral rates, patient resistance, financial and access related issues (Cox, 1997). Other researchers have suggested early intervention in the hospital and home based programmes may increase adherence to CR (Perkins, Oldenburg & Andrews, 1986).

5.1.1 Rates of Adherence at 5 Month Follow-up

A secondary aim of the present study was to examine adherence rates after completing the hospital programme to determine the number of MI patients who adhered to their exercise programme. Exercise adherence patterns at the 5 month follow-up were consistent with prior research with 47% exercising according to CEAP prescription and 66% of those interviewed walking every day. The findings were consistent with the rates of exercise non-adherence according to one review of randomised CR trials, where the rate of dropout was 40-50% by 6 months (Bittner & Oberman, 1993). When other forms of moderate exercise were included in addition to walking, the majority of the follow-up sample (71%) were conducting regular physical activity at the
appropriate intensity. These findings provide further support for the effectiveness of some aspects of the cardiac rehabilitation intervention.

The findings also imply that there is a need for clinicians to increase their health education for post MI patients regarding what exercise can be classed as moderate. According to clinicians at CEAP, MI patients are expected to maintain their walking programme at home once CR is completed. If MI patients were provided with more information about other forms of moderate exercise (e.g. mowing the lawn, gardening, general cleaning, golf, table tennis) that could be completed at home then adherence to treatment may be further enhanced. Researchers have found that individuals were more likely to stick to moderate exercise rather than a fitness regimen (Dishman, 1991). Data drawn from an American healthy sample suggested that more men (11%) than women (5%) adopted a vigorous exercise routine such as running and a higher proportion of women (33%) than men (26%) engaged in moderate exercise such as walking, stair climbing and gardening (Dishman, 1991).

In comparison to 7-day activity recall measures at follow-up, mean self-report percentage estimates were lower than expected. Interestingly, 24% of the sample at follow-up were exercising at a moderate level even though they had not completed the hospital programme. This finding suggests that some MI patients may have incorporated exercise as part of their lifestyle and it is difficult to separate the effects of attending CEAP as other factors such as spouse support and self efficacy may influence patients' choice to conduct regular exercise.
5.1.2 Relationship between Adherence during Hospital Programme and at Follow-up

There was a significant relationship between adherence at entry and at follow-up according to number of sessions, patient self-estimates and 7-day activity recall. Results indicated that the same MI patients who attended CEAP were more likely to be adhering at 5 month follow-up. It appears that CEAP was effective for those patients who adhered to the hospital programme and this may have bearing on adherence rates at follow-up.

Other studies have found those individuals who adhered to an exercise programme during the hospital segment were more likely to be adhering to the programme at follow-up (Prosser, Carson & Phillips, 1985). In another study which included follow-up after cardiac rehabilitation (Van Elderen et al., 1994), researchers found that two months after cardiac rehabilitation, MI patients in the experimental condition reported significantly greater increases in physical activity and decreases in unhealthy eating habits. At 12 month follow-up in the same study, MI patients in the experimental condition compared to the control group reported significantly greater decreases in unhealthy eating habits and increase in smoking cessation (Van Elderen et al., 1994).

5.1.3 Exercise Motivation for MI and Healthy samples

MI patients reported that their main reasons for exercising at entry to cardiac rehabilitation were due to Health Pressures, Ill Health, Positive Health and all are consistent with the desire to recover from the effects of coronary heart disease. At 5 month follow-up the same health related reasons remained consistently high motivators (e.g. Ill Health, Positive Health, Health Pressures). In addition, MI patients’ exercise motivations of Revitalization, Enjoyment, Competition and Stress Management became relatively higher motivational
components over time. In particular, Stress Management motivations increased over time. As expected the present results are supported by other studies which found that MI patients are motivated to attend CR due to doctors' recommendation and wellness (Ades et al., 1992; Fluery, 1991).

The main reasons the healthy UK sample exercised were due to Positive Health, Ill Health, Weight Management and Nimbleness while exercising due to Health Pressures was lower in importance. Enjoyment as a reason for exercising was higher in the UK healthy sample than the Australian MI sample. Exercise motivations (Health pressures, Ill health, Stress Management, Positive Health and Strength) were higher overall for the Australian MI sample than the UK healthy exercisers (Ingledew et al., 1998). In comparison, MI patients and healthy exercisers tended to rate exercising for Social Recognition, Competition or Appearance reasons as relatively low. There were significant differences between the MI sample and the healthy UK sample for conducting exercise due to Health Pressures, Ill Health and Strength. One possible explanation for the findings may be that MI patients, after a major health scare, take health-related concerns more seriously than healthy individuals. Another possibility could be that after MI patients complete the hospital based programme they become more aware of the risk factors through the group educational component of CEAP and recognise they need to manage stress and their health in order to prevent further heart attacks.

For MI patients, there appears to be relatively little enjoyment for exercise. However, according to Cognitive Evaluation Theory if clinicians were able to increase enjoyment then they may be able to increase subsequent adherence. Researchers have suggested that the fostering of interesting forms
of exercise should be encouraged once the patient leaves the supervised activity to increase adherence (Wankel, 1985). For example, the actual physical exercise may have to become part of an ‘event’ or combination of activities which may provide enough fun or novelty for patients to become motivated enough to participate in the ‘event’ and then continue the exercise unsupervised. This may take the form of exercising to music but perhaps to new music which participants may choose each week for others to share. Or it may take the form of listening to a tape on various topics of interest, while exercises are being completed. In this sense the repetitive exercise does not become the focus of the session each time but remains an inextricable part of a more interesting ‘event’.

5.1.4 Intrinsic and Extrinsic Motivation

Results of the descriptive analyses indicated that both intrinsic and extrinsic motivation decreased over time. There were non-significant differences between intrinsic and extrinsic motivation over time. However, there were slight increases in the follow-up sample due to exercising for Nimbleness, Revitalization, Appearance and Affiliation. Results suggest that it is difficult to conceptualise some of the effects surrounding MI as being either intrinsic or extrinsic. For example, MI patients after a major health scare may view heart attacks as not being within their control and thus these could be construed as external forces that drive them to exercise and survive. These forces may be related to doctors’ recommendations, health pressures and weight control which may be extrinsic in focus. However, MI patients may exercise due to health reasons, which could be seen to be positive or intrinsically orientated.
However exercise motivations may be influenced by an external event such as heart attack which is extrinsic in focus.

5.1.5 Psychological Distress for MI and Healthy Samples

Descriptive analyses reveal that the follow-up sample at entry were slightly more psychologically distressed than the total sample. In comparison to a healthy Australian sample, MI patients were slightly more psychologically distressed than the healthy sample. There was a statistically significant difference between the MI sample and the healthy sample for anxiety. Results also indicated that MI patients became less psychologically distressed over time. These findings are supported by research which has found psychological distress is part of the normal emotional response following MI and it tends to decrease over time (Lewin, 1993; Oldridge et al., 1994).

5.2 The Hypotheses

5.2.1 Intrinsic, Extrinsic Motivation and Adherence

Cognitive Evaluation Theory suggests that extrinsic motivation decreases while intrinsic motivation increases over time. Results indicated that there was a non-significant change in intrinsic motivation and a non-significant in extrinsic motivation from entry to 5-month follow-up which was inconsistent with Cognitive Evaluation Theory. The present results were contrary to research that examined Stages of Change Theory (Prochaska & Diclemente, 1983) and exercise involvement for a UK healthy sample (Ingledew, Markland & Medley, 1998). Researchers found that extrinsic motives dominate during the early stages of exercise adoption and during the action phase, whereas intrinsic motives are low during early phases and increased during the maintenance phase (Ingledew et al., 1998). One explanation for the findings may be that MI
patients may be both intrinsically and extrinsically motivated to exercise. It appears that exercise motivations fluctuate depending upon time of the assessment and the particular characteristics of the sample.

It was further hypothesised that MI patients who adhered to follow-up would be intrinsically motivated while those who did not adhere would be extrinsically motivated. There was no support for the hypothesis and the findings were contrary to Cognitive Evaluation Principles. It is possible that MI patients may not have had enough time over the 5 month period to develop intrinsic motivation or enjoyment for exercise. Research suggests that intrinsic motivation is related to long-term maintenance of behaviour change (Ingledew, Markland & Medley, 1998). That is, MI patients in the present sample have reported that they do not maintain exercise due to an intrinsic interest. Rather, MI patients may initiate exercise due to external reasons such as health but when the benefits set in MI patients may develop enjoyment for the activity, then intrinsic motivation begins to play a role in behaviour change.

Results of the present study were different to the Oman and McAuley (1993) study that found that there was a relationship between intrinsic motivation and adherence (attendance) for participants conducting a community aerobic exercise programme. One explanation for intrinsic motivation being associated with exercise adherence in the Oman and McAuley study, but not in the present study, may be the use of different measures of Intrinsic Motivation. Whist in the present study the present researcher used subscales of the EMI, Oman and McAuley used the Intrinsic Motivation Inventory (IMI). In addition community participants may be more intrinsically motivated than MI patients who tend to be older, have coronary conditions and
have sedentary exercise habits. The results of the present study suggest a lack of clarity regarding the extent that exercise motivation explains adherence for MI patients, particularly when compared to other variables such as psychological distress which has been related to adherence in prior research (Blumenthal et al., 1982).

5.2.2 Psychological Distress and Adherence

It was hypothesised that there would be a significant relationship between psychological distress and adherence during the hospital programme and at 5 months follow-up. Results indicated that there was a negative significant relationship between anxiety and patient self-estimates of adherence during 5-month follow-up. Results imply that higher levels of anxiety were associated with lower levels of patient self-estimates of adherence at follow-up. These findings are consistent with those of other researchers who found that there was a relationship between psychological distress and adherence to cardiac rehabilitation (Blumenthal et al., 1982).

However, the MANOVA results revealed that the differences between MI patients who adhered and those who did not adhere were not significantly different for psychological distress over time. One possible explanation for these trends was identified. There was a large amount of group variability within groups for psychological distress (DASS). That is, there were highly variable levels of psychological distress amongst both adherers and nonadherers which may mask between group differences.

The finding that anxiety was related to lower levels of exercise adherence may suggest that MI patients with higher anxiety may also have
greater concern or worries related to conducting physical activity. If this is the case they may limit their usual activities to prevent heart attack even when normal activity is medically acceptable. The implications for treatment may be to incorporate psychological treatment such as cognitive behavioural therapy in addition to drug therapy and exercise regimens within CR programmes. According to Blumenthal and Wei (1993) there is a need to increase the role of the psychologist in cardiac rehabilitation programmes. Within Australian CR programmes the role of the psychologist has been limited while it varies considerably within European CR programmes (Briffa et al., 1993; Maes, 1992).

5.2.3 Intrinsic, Extrinsic Motivation, Psychological distress as Predictors of Adherence

It was hypothesised that intrinsic, extrinsic motivation and psychological distress would predict adherence to exercise therapy. Intrinsic, extrinsic motivation and psychological distress were not significant predictors of exercise adherence when attendance and minutes of exercise at follow-up were used to represent adherence. The available research indicates that there should be a relationship between intrinsic, extrinsic motivation and psychological distress but the findings of the present research are consistent with “few” other studies which found no relationship (Garcia & King, 1991; Gale et al., 1984; Granlund et al., 1998; Radtke, 1989). In these studies self-motivation did not continually predict adherence to treatment. Ajzen and Fishbein (1977) also contend that attitude toward a behaviour such as exercise does not predict subsequent behaviour. However, there are a number of limitations in the present study that may have reduced the ability of the study to detect hypothesised effects.
5.3 Limitations

Perhaps the main limitation of the present study was the relatively small sample size. In particular, the sample used in the present study was not representative, consequently any generalisations from the present findings to other MI patients should be made with care. The response rate for the data collection during the pre-test was 50% and 76% at post test. This response rate was lower during the pre-test than similar studies that reported response rates up to 82% to 84% (Gale, Eckhoff & Rodnick, 1984; Oldridge et al., 1983). However, the response rate during the posttest follow-up was comparable to other studies that had a response rate between 33% and 52% (Gale et al., 1984; Oldridge & Streiner, 1989).

According to Robinson and Rogers (1994) small sample sizes are an inherent problem in clinical research. The present study was also limited by these difficulties. In addition to reducing the power of many of the analyses, the limited sample size meant that several factors that might influence adherence could not be assessed.

Researchers have suggested that cultural status and gender may influence involvement in CR programmes (Ades, Waldmann, Polk & Coflesky, 1992; Cox, 1997). That is, women and minority groups appear to be underrepresented within CR programmes. Future research should explore the reason individuals from culturally diverse backgrounds and women are not accessing CR programmes. In addition, the present study was limited due to its design. It was essentially a pre-post test design and lacked a control group. It would be advantageous to include a MI sample who were age matched and did not complete CEAP to compare rates of exercise adherence, motivation and
psychological distress. However, researchers have suggested that it is difficult to recruit MI patients who are willing to be placed in randomised control groups (Bittner & Oberman, 1993). Also, it is difficult to separate research findings as being related to exercise on its own due to confounding effects such as diet and medication (Oldridge, 1988). In addition, there were a number of tests conducted and no correction for Type 1 error was made due to the exploratory nature of the research. The possibility for Type 1 error was therefore increased.

Other potential limitations in the present study relate to the theoretical framework for exercise motivation, measurement of exercise adherence and research design factors. The present study was exploratory and the definitions of intrinsic/extrinsic motivation whilst consistent with Cognitive Evaluation Theory still did not match the theory precisely. One possibility for the inconsistent results may be that the role of intrinsic and extrinsic motivation in relation to exercise for MI patients is different from other forms of exercise such as sport motivations that were used to help formulate the theory. Another explanation for the inability of intrinsic/extrinsic motivation to distinguish between those patients who adhered from those who did not adhere was captured by other authors who suggested that “motivation is a complex, cognitive and behavioral phenomenon which can be viewed as a process, and where the components contribute to motivation in different ways for different individuals” (Granlund et al., 1998 p. 94). Hence, it is likely that intrinsic and extrinsic motivation may not be related to actual exercise behaviour. There appear to be other factors such as self-efficacy that may be more important for exercise adherence.
Rates of exercise adherence appear to be variable and there is a lack of consistency in definitions (Robinson & Rogers, 1994). This inconsistency is exacerbated further by the variability in defining “moderate exercise” which is often part of the adherence criteria (Dubbert, 1992; Pate et al., 1995). In addition, there are different sources of monitoring exercise adherence such as health care professional observation versus patient self-report (Sluijs & Knibbe, 1992). There are a wide variety of exercise programme settings e.g., outpatient versus unsupervised programmes at home or community based settings (Vita & Owen, 1995) which also may confound the results. Julkunen and Saarinen (1994) add that “One problem for both research and clinical practice is the diversity of available measurement techniques for assessment of the factors … Due to this, comparison and evaluation of results from different research centres is quite difficult” (p. 69).

5.4 Suggestions for Further Research

The exploratory nature of the research highlights the need for further study to construct a model that incorporates other psychological, physical, environmental factors and consistent definitions of exercise motivation that influence exercise adherence such as self efficacy, social support, gender and medical condition. For example, researchers suggest future studies need to examine exercise motivation according to Organismic Integration Theory (OIT), a derivative sub-theory of self-determination theory (Deci, Vallerand, Pelletier & Ryan, 1991; Mullan, Markland and Ingledew, 1997). It is argued that OIT theory explains the processes of being both intrinsically and extrinsically motivated at the same time. The results of the present study indicate that there is a continuum of intrinsic and extrinsic motivation rather than a dichotomy.
However, future research should develop consistent operational definitions of intrinsic, extrinsic and exercise motivation, which are related to theory.

The results from this study suggest that there is a need to standardise the measurement and monitoring techniques such as attendance during the structured phase of treatment, exercise stress test results, self-reported ratings, 7-day activity recall and other measures of exercise adherence. There are moves by peak bodies in Australia such as the National Heart Foundation and the Australian Cardiac Rehabilitation Association to develop policy statements on key performance indicators for cardiac rehabilitation outcomes. They aim to provide guidelines for a national database in order to standardise adherence measures for service providers (Morrow & McBurney, 1999).

There is a need to have consistency regarding the classification and measurement of moderate exercise so that researchers in future studies are measuring the same treatment outcomes across studies. Researchers in future studies may use electronic activity monitors that record patterns of physical activity over time for several weeks. Thus, moderate intensity physical activity patterns would be assessed objectively and incidental activity would be recorded accurately. Electronic activity monitors could be used to validate self-report data such as the 7-day activity recall interview method (Sallis & Owen, 1999).

It is likely that psychological distress influences adherence to exercise therapy in CR. It appears that the links between adherence to coronary treatment interventions and psychological factors are not clearly understood. Further research into psychological distress and treatment adherence should include the testing of empirical models. Theoretical frameworks such as the
Causal Model of Invalidism (Reigal et al., 1998), Stages of Change Theory (Prochaska & Diclemente, 1983), and life span approach (Biddle, 1995) may be useful in predicting adherers to CR treatment. Biddle (1995) suggests that there is a need to examine how motivation changes during stages of life i.e. child, teenager, adult and older adult. This reflects beliefs that motivation changes dependant of context. Similarly, future studies are needed to conduct long-term follow-up trials to determine the most significant factors that influence exercise adherence in MI patients.

There is a need to clarify which psychological interventions are the most effective for use with coronary patients within cardiac rehabilitation. For example, one review of 2024 patients who received psychosocial treatment compared with 1156 control subjects (Linden, Stossel & Maurice, 1996) found that when CR patients were treated with psychological interventions there was a decrease in psychological distress, systolic blood pressure, heart rate and cholesterol level. In fact, there was an increase in the mortality rate of the group of patients who did not receive psychological intervention during the first 2 year follow-up.

Further support for the addition of stress management training in CR comes from the results of the present research, which indicate that the relationship between stress and adherence approached significance. Other researchers (Blumenthal et al., 1997) suggest that stress management training programmes produce added advantages for patients who have had MI. Researchers maintain that physical conditioning on its own as a treatment for coronary patients was not as beneficial as adding psychological interventions such as relaxation training with an emphasis on reducing over arousal and
anxiety (Perkins, Oldenburg & Andrews, 1986). Langosch (1994) adds that there is a need to include psychological intervention (relaxation training, stress and anger management) as well as physical training.

5.5 Conclusion
The present research found support for the effectiveness of the Cardiac Rehabilitation Programme at Westmead hospital for those MI patients who adhered to exercise therapy in the hospital and at 5-month follow-up. In order to obtain the most accurate picture of exercise adherence practitioners and researchers need to use more than one measure of adherence. There is a need to generate guidelines for measuring treatment adherence at a national level and these need to be empirically driven. Those attempting to enhance patient adherence with therapeutic exercise would be wise to consider psychological distress factors such as anxiety with MI patients during the treatment planning process. Unfortunately the limited sample size and the highly variable characteristics of the present sample make firm conclusions about the role of motivation and psychological distress in exercise adherence premature. However, continued research in this area, along the lines suggested may yield valuable health and economic outcomes in the future.
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Appendix 1: Informed Consent

University of Wollongong

Human Research Ethics Committee

CONSENT FORM

Motivation, Psychological Distress and Exercise Adherence Following Myocardial Infarction.

This research project is being conducted as part of a Master of Arts (Honours) program for Angela Ljubic supervised by Mark Anshel in the Department of Psychology at the University of Wollongong. For further information regarding the study contact Angela Ljubic on (042) 214513.

This study’s purpose is to examine the extent to which personal dispositions influence the effectiveness of cardiac rehabilitation exercise therapy. You will be asked to fill out four self report questionnaires.

No risks inconvenience or discomforts are expected to occur as a result of participating in this study. All data obtained is confidential. You are free to withdraw from the research at any time without any effect on your treatment.

If you have any enquiries regarding the conduct of the research please contact the Secretary of the University of Wollongong Human Research Ethics Committee on (042) 214457.

I understand that the data collected to investigate the above aims and I consent for the data to be published with no mention of any personal information to ensure complete confidentiality. The results of the study will be available from December 1998 and may be obtained through the Westmead coronary care unit.

If you wish to take part in this research please sign below.

Signature ____________________________ Date ___ / ___ / ___
# Appendix 2: Depression, Anxiety Stress Scale

**DASS**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date:</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>2</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>3</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>4</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>5</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>6</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>7</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>8</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>9</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>10</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>11</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>12</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>13</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>14</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>15</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>16</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>17</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>18</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>19</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>20</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>21</td>
<td><strong>0</strong></td>
<td><strong>1</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>
Appendix 3: Exercise Motivation Inventory-2

Below are a number of statements concerning the reasons people often give when asked why they exercise. **Whether you currently exercise regularly or not,** please read each statement carefully and indicate, by circling the appropriate number, whether or not each statement is true for you personally, or would be true for you if you did exercise. If you do not consider a statement to be true for you at all, circle '0'. If you think that a statement is very true for you indeed, circle the '5'. If you think that a statement is partly true for you, then circle the '1', '2', '3' or '4', according to how strongly you feel that it reflects why you exercise or might exercise.

Remember, we want to know why **you personally** choose to exercise or might choose to exercise, not whether you think the statements are good reasons for **anybody** to exercise.

**Personally, I exercise**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all true for me</th>
<th>Very true for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  To stay slim.</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>2  To avoid ill-health</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>3  Because it makes me feel good</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>4  To help me look younger</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>5  To show my worth to others.</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>6  To give me space to think.</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>7  To have a healthy body.</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>8  To build up my strength.</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>9  Because I enjoy the feeling of exerting myself.</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>10 To spend time with my friends</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>11 Because my doctor advised me to exercise</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>12 Because I like trying to win in physical activities</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>13 To stay/become more agile</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>14 To give me goals to work towards</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>15 To lose Weight</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>16 To prevent health problems</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>17 Because I find exercise invigorating</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>18 To have a good body</td>
<td>0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personally, I exercise</td>
<td>Not at all true for me</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>19</td>
<td>To compare my abilities with other people’s</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>20</td>
<td>Because it helps to reduce tension</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>21</td>
<td>Because I want to maintain good health</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>22</td>
<td>To increase my endurance</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>23</td>
<td>Because I find exercising satisfying in and of itself</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>24</td>
<td>To enjoy the social aspects of exercising</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>25</td>
<td>To help prevent an illness that runs in my family</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>26</td>
<td>Because I enjoy competing</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>27</td>
<td>To maintain flexibility</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>28</td>
<td>To give me personal challenges to face</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>29</td>
<td>To help control my weight</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>30</td>
<td>To avoid heart disease</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>31</td>
<td>To recharge my batteries</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>32</td>
<td>To improve my appearance</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>33</td>
<td>To gain recognition for my accomplishments</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>34</td>
<td>To help manage stress</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>35</td>
<td>To fell more healthy</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>36</td>
<td>To get stronger</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>37</td>
<td>For enjoyment of the experience of exercising</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>38</td>
<td>To have fun being active with other people</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>39</td>
<td>To help recover from an illness/injury</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>40</td>
<td>Because I enjoy physical competition</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>41</td>
<td>To stay/become flexible</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>
**Personally, I exercise**

<p>| | | | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>42</td>
<td>To compare my abilities with other people's</td>
<td>Not at all true for me</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>43</td>
<td>Because exercise helps me to burn calories</td>
<td>For me</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>44</td>
<td>To look more attractive</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>45</td>
<td>To accomplish things that others are incapable of</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>46</td>
<td>To release tension</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>47</td>
<td>To develop my muscles</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>48</td>
<td>Because I feel at my best when exercising</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>49</td>
<td>To make new friends</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>50</td>
<td>Because I find physical activities fun, especially when competition is involved</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>51</td>
<td>To measure myself against personal standards</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

*Thank you for completing this questionnaire*
Appendix 4: Table of Common Physical Activities by intensity of Effort required in MET Scores and Kilocalories per Minute.

<table>
<thead>
<tr>
<th>Light (≤ 3.0 METs or &lt;4 kcal min)</th>
<th>Moderate (3.0-6.0 METs or 4-7 kcal min)</th>
<th>Hard/Vigorous (&gt;6.0 METs or &gt;7 kcal min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking, slowly (strolling) (1-2 mph)</td>
<td>Walking, briskly (3-4 mph)</td>
<td>Walking, briskly uphill or with a load</td>
</tr>
<tr>
<td>Cycling, stationary (&lt;50W)</td>
<td>Cycling for pleasure or transportation (&lt; 10 mph)</td>
<td>Cycling, fast or racing (&gt;10 mph)</td>
</tr>
<tr>
<td>Swimming, slow treading</td>
<td>Swimming moderate effort</td>
<td>Swimming, fast treading or crawl</td>
</tr>
<tr>
<td>Conditioning exercise, light stretching</td>
<td>Conditioning exercise general calisthenics</td>
<td>Conditioning exercise, stair ergometer, ski machine</td>
</tr>
<tr>
<td>Conditioning exercise, general calisthenics</td>
<td>Racket sports, table tennis</td>
<td>Racket sports, singles tennis, racketball</td>
</tr>
<tr>
<td>Golf, power cart</td>
<td>Golf, pulling cart or carrying clubs</td>
<td></td>
</tr>
</tbody>
</table>

Data from Ainsworth et al, Leon, and McCardle et al. The METs (Work metabolic rate/resting metabolic rate) are multiples of the resting rate of oxygen consumption of a seated adult at rest, or about 3.5 mL min kg. The equivalent energy cost of 1 MET in kilocalories min is about 1.2 for a 70 kg person, or approximately 1 kcal kg hr (cited in Pate et al. 1995).
Appendix 5: Structured Interview

University Of Wollongong

Cardiac Education Assessment Study

Structured Interview Questions

Code Number____________ Start________
Date of Interview___________ Finish_____

Opening statement: My name is Angela Ljubic. I am a postgraduate student from the University of Wollongong. You may recall that you completed my survey package at the CEAP Westmead Hospital Program and gave me permission to interview you at a later date. Please note that I am not working for Westmead Hospital and your responses will be kept confidential and your name will not be connected with any data that may link you to these responses. Would you spare about 15 minutes to answer some questions or shall I ring you at a more convenient time?

Yes____ No________

What time would be more suitable?______

There are no right or wrong answers to the questions, I am interested in your honest opinion. I’m going to ask you questions about the your exercise program at home, your thoughts on the Cardiac Education and Assessment Program at Westmead Hospital and reasons that you do exercise or don’t exercise.

(A) CURRENT EXERCISE PROGRAM
1. What exactly was the exercise program that was prescribed to you by the staff at Westmead Hospital? Is there anything else?

Type
Frequency
Length of time
Intensity
Do they remember the Borg’s scale?
Did you go to the appointments with cardiologist;
Did you test your cholesterol level prior to reassessment or 6 mths f/up.
2. What were the main ways to keep track of exercise programme at home that the staff at Westmead Hospital had suggested?

3. To what extent are you following the exercise program prescribed by Westmead staff? What part exercise program are you following?

4. What percentage of the week over the last 3 months had you completed your exercise programme?
5. How different is your program as compared to the one prescribed by the staff at Westmead Hospital?

6. What are the main reasons that you aren’t following the exercise program?

7. Was this a typical week for you regarding your opportunity to complete the exercise program that was prescribed to you at Westmead Hospital?
   Yes_________ No_________
   If No, then what was unusual about it
8. If this was a typical week complete table below.
Over the last 7 days please describe the exercise program you engaged in?

<table>
<thead>
<tr>
<th>Borg Scale</th>
<th>What type of exercise?</th>
<th>How many minutes per day?</th>
<th>How hard were you working?</th>
<th>Do you remember the scale that you learnt at Westmead? According to the scale how hard were you working?</th>
<th>Who did you exercise with? What was their relationship to you? How many people support your exercise?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Nothing at all</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Very weak</td>
<td></td>
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<td></td>
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<tr>
<td>2</td>
<td>Weak</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Semi strong</td>
<td></td>
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<td></td>
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<tr>
<td>5</td>
<td>Strong</td>
<td></td>
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<td></td>
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<tr>
<td>6</td>
<td>Very strong</td>
<td></td>
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<td></td>
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<tr>
<td>7</td>
<td>Maximal</td>
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<td>Sunday</td>
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<td>Saturday</td>
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</tbody>
</table>
9. If this was not a typical week complete table below. 
Over the last 7 days please describe the exercise program you engaged in?

<table>
<thead>
<tr>
<th>Borg Scale</th>
<th>What type of exercise?</th>
<th>How many minutes per day?</th>
<th>How hard were you working?</th>
<th>Do you remember the scale that you learnt at Westmead? According to the scale how hard were you working?</th>
<th>Who did you exercise with? What was their rel' ship to you? How many people support your exercise?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Nothing at all</td>
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<tr>
<td>0.5</td>
<td>Very very weak</td>
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<td>1</td>
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<td>2</td>
<td>Weak</td>
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<td>3</td>
<td>Moderate</td>
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<td>4</td>
<td>Semi strong</td>
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<td>5</td>
<td>Strong</td>
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<td>7</td>
<td>Very strong</td>
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<td>8</td>
<td>Maximal</td>
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<tr>
<td>9</td>
<td>Maximal</td>
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<tr>
<td>10</td>
<td>Maximal</td>
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</table>

<table>
<thead>
<tr>
<th>Day</th>
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<td>Sunday</td>
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<td>Monday</td>
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<td>Saturday</td>
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</tbody>
</table>
9. What would you like to see improved in the program?

10. The following questions will take about 5 more minutes, is it OK to continue?
Yes________No_________
If No Can I mail out the questionnaire for you to complete at home?
What is your address?

EMI- 2 was administered here.

Any other comments that you would like to make?

Would you agree to be interviewed at a later date?
Yes ___ No__________

Thanks very much for your time. Your contribution will be helpful in improving rehabilitation services for other people at Westmead Hospital. Would you like me to send you a summary of the study. If so, please give me your address.
Appendix 6: Coding Document for phase 1

UNIVERSITY OF WOLLONGONG

CARDIAC EDUCATION ASSESSMENT STUDY

To assist in the analysis of the survey, we would like some basic information about yourself.

1. **Age**
   - _____ Years

2. **Gender**
   - Male [1]
   - Female [2]

3. **Marital Status**
   - Single [1]
   - Married [2]
   - Widowed [3]
   - Divorced [4]
   - Defacto [5]

4. **Occupation (Tick one)**
   - Manager or Administrator [1]
   - Professional [2]
   - Para-professional [3]
   - Self Employed [4]
   - Tradesperson [5]
   - Clerk [6]
   - Salesperson or Personal Service worker [7]
   - Plant or Machine Operator or Driver [8]
   - Labourer or Related worker [9]
   - Domestic Duties [10]
   - Student [11]
   - Invalid Pension [12]
   - Unemployed [13]
   - Retired [14]
   - Other- Please state [15]
Appendix 7: Coding Document for phase 2

University Of Wollongong

Cardiac Education Assessment Study

Structured Interview Questions

Code Number Start
Date of Interview Finish

The days since the first set of data was collected was coded as the variable \text{sinfirst}.
The number of minutes the interview was conducted was entered under the variable \text{duration}.

Opening statement: My name is Angela Ljubic. I am a postgraduate student from the University of Wollongong. You may recall that you completed my survey package at the CEAP Westmead Hospital Program and gave me permission to interview you at a later date. Please note that I am not working for Westmead Hospital and your responses will be kept confidential and your name will not be connected with any data that may link you to these responses. Would you spare about 15 minutes to answer some questions or shall I ring you at a more convenient time?
Yes No
What time would be more suitable?

The data re convenient time was not coded for this study.

There are no right or wrong answers to the questions, I am interested in your honest opinion. I’m going to ask you questions about the your exercise program at home, your thoughts on the Cardiac Education and Assessment Program at Westmead Hospital and reasons that you do exercise or don’t exercise.

(A) CURRENT EXERCISE PROGRAM
1. What exactly was the exercise program that was prescribed to you by the staff at Westmead Hospital? Is there anything else?

The participant responses were coded as: 0 = No, 1 = Yes, 2 = prompted.
That is the participants who remembered that they were told to do walking daily were coded as 1, those who didn’t remember were coded as 2 and those who I prompted and said the correct response were coded as 2.
The variable for this question was called \text{exerprog}.

Type This variable was not coded.
Frequency This variable was coded as 0 = No, 1 = Yes, 2 = prompted. It was called \text{frecency}.
Length of time This variable was coded as 0 = No, 1 = Yes, 2 = prompted. It was called \text{time}.
Intensity This variable was coded as 0 = No, 1 = Yes, 2 = prompted. It was called \text{intesity}.
Do they remember the Borg's scale?
This variable was coded as 1 = No, 2 = Yes. It was called borssca.

Did you go to the appointments with cardiologist?
This variable was coded as 0 = No, 1 = Yes. It was called drsappoi.

Did you test your cholesterol level prior to reassessment or 6 mths f/up.
This variable was coded as 0 = No, 1 = Yes. It was called cholchec.

2. What were the main ways to keep track of exercise programme at home that the staff at Westmead Hospital had suggested?
This question was discarded as monitoring at home was not covered by the staff at Westmead.

3. To what extent are you following the exercise program prescribed by Westmead staff?
What part exercise program are you following?
This variable was coded as 0 = No, 1 = Yes. It was called folowexe.
The participants who said that they were not following the programme were given a 0 while those who stated that they were doing the walking were given a 1.

4. What percentage over the last 3 months had you completed your exercise programme?
This variable was called nocomply. The participants gave a percentage estimate and this number was entered into the variable.

5. How different is your program as compared to the one prescribed by the staff at Westmead Hospital?
This variable was coded as 0 = No, 1 = treadmill, 2 = gardening, 3 = exercise bike, 4 = exercise gymnastics, 5 = stretching exercises, 6 = TV aerobics, 7 = golf, 8 = mowing, 9 = aerowalker, 10 = bike riding, 11 = swimming, 12 = water-skiing, 13 = housework, 14 = tennis.
It was called diferent.

6. What are the main reasons that you aren’t following the exercise program?
The variable was collapsed into reason 1 and reason2. The reasons were classified as 1 = weather, 2 = lack of time, 3 = lazy, 4 = work commitment, 5 = pain/health problem, 6 = breathing difficulty, 7 = arthritis, 8 = lifestyle, 9 = tired, 10 = travel.

7. Was this a typical week for you regarding your opportunity to complete the exercise program that was prescribed to you at Westmead Hospital?
Yes_________No_________
If No, then what was unusual about it
This variable was not coded as there were only two people who said that the week was not typical for them.
8. If this was a typical week complete table below.
Over the last 7 days please describe the exercise program you engaged in?

<table>
<thead>
<tr>
<th>Borg Scale</th>
<th>What type of exercise?</th>
<th>How many minutes per day?</th>
<th>How hard were you working?</th>
<th>Do you remember the scale that you learnt at Westmead? According to the scale how hard were you working?</th>
<th>Who did you exercise with?</th>
<th>What was their relationship to you?</th>
<th>How many people support your exercise?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Nothing at all</td>
<td></td>
<td></td>
<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>1</td>
<td>Very weak</td>
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<td></td>
<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>2</td>
<td>Weak</td>
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<td></td>
<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>3</td>
<td>Moderate</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<td>4</td>
<td>Sui Va sur</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>Sunday</td>
<td>Variable called sun</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<td>Monday</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<td>Tuesday</td>
<td>tuestype</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>Wednesday</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>Thursday</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
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<tr>
<td>Saturday</td>
<td>sattype</td>
<td></td>
<td></td>
<td>This variable was called spouse. This variable was coded as 0 = No, 1 = Yes. That is, participants who reported that they exercised with their spouse or friends on any of the last 7 days was given a number.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
The EMI-2 was coded as fuemi1 - fuemi51.
The DASS was coded as fudas1 - fudas21.

Any other comments that you would like to make?

This question was not coded.

Would you agree to be interviewed at a later date?

Yes ___ No_______

Thanks very much for your time. Your contribution will be helpful in improving rehabilitation services for other people at Westmead Hospital. Would you like me to send you a summary of the study. If so, please give me your address.
Appendix 8: Instructional sheet for data collection

The Instruction Sheet for Data Collection Staff

Dear Sir/Madam,

Thank you for your co-operation with the data collection for this research. The researcher would appreciate your consideration of the following aspects.

This data will be completely confidential and that names are not required on the survey package. Please explain to all participants that the researcher is not interested in any individual answers but is looking at a pool of information that tells the researcher about how coronary patients think. The study is not a test and there are no right or wrong answers. The staff member should explain that the participant can terminate involvement at any time without any penalty. In addition, the data collection person needs to read the consent form to each participant and have them sign this form.

Thank you for your cooperation.

Procedure

1. Please give out survey package to the participants.
2. Read through the consent form and sign the sheet and explain the issue of confidentiality.
3. Ask the participants to complete the survey and the consent to participate in the phase 2 data collection process or interview.
4. When they are finished have them return the survey to you. Please return the survey package to the researcher.

<table>
<thead>
<tr>
<th>Avoidable reasons</th>
<th>Unavoidable reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of interest</td>
<td>Travel distance</td>
</tr>
<tr>
<td>Work commitments</td>
<td>Medical</td>
</tr>
<tr>
<td>Family commitments</td>
<td></td>
</tr>
<tr>
<td>Lack of contact</td>
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</tr>
</tbody>
</table>