Attendance to Maintenance Community-Based Cardiac Rehabilitation: Reasons and Outcomes

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Abstract

Cardiac Rehabilitation (CR) is an effective healthcare service for the secondary prevention of coronary artery disease (CAD). Despite this, internationally there remains an issue of low attendance by CAD patients across all phases of CR. Research has been undertaken to understand the reasons behind this low attendance rate, however most of the research has focused on earlier stages of CR and not the maintenance community-based phase. The current study aimed to examine the reasons and outcomes of different attendance rates to two maintenance community-based CR programmes using the Health-Belief Model as the theoretical framework.

A total of 44 elderly (≥60 years old) CAD patients whom had completed out-patient CR were recruited. Patients were examined according to their attendance rate to one of the two maintenance community-based CR programmes in Dunedin [high-attenders (HA, n=11); low-attenders (LA, n=16) or non-registered (NR, n=17)]. In accordance with the Health-Belief Model, patients' were surveyed on their perceived threat of CAD, sociodemographic characteristics, cues to action to attend CR and their perceived benefits and barriers to attending CR. Patients also had their physical functioning, physical activity levels and quality of life measured to determine the outcomes of different attendance rates.

Differences were seen between the three groups on cues to action, perceived benefits and perceived barriers sections. In cues to action differences were seen in the encouragement given to attend from external factors such as family, and others having heart problems, as well as internal factors such as worry about health and not wanting another heart attack. In perceived benefits differences were seen between the three study groups in gain of ability to perform activities of daily living, body functioning, sense of accomplishment, muscle strength and cardiovascular system functioning. The only

difference in perceived barriers was the HA and LA groups perceived a greater need for healthcare compared to the NR group (HA: 1.72 ± 1.23 & LA: 1.38 ± 0.39 vs NR: 2.48 ± 0.63 p=0.001). Only physical activity level showed a difference in the outcome measures; the HA group had a higher energy expenditure over a 7-day period compared to the LA and NR groups (HA: 3819.4 ± 117.8 vs LA: 2434.2 ± 1057.8 vs NR: 2643.1 ± 1333.1 kCal/week p=0.013). Additional findings on cues to action, perceived benefits and perceived barriers have added new themes regarding the efficacy of encouragement from the cardiology team and other health-professionals, the importance of social benefits and how other commitments and undertaking own exercise routine are seen as barriers to attending maintenance community-based CR.

In conclusion it appears that the decision to attend maintenance community-based CR is influenced by cues to action, perceived benefits and perceived barriers, but not perceived threat. Additional comments made from patients on cues to action, perceived benefits and perceived barriers have added some new factors to consider when examining reasons behind attendance rates to maintenance community-based CR. The results also support the importance of considering a holistic approach to healthcare when administrating maintenance community-based CR, so as to meet the many needs of patients.

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Chapter One: Introduction

1.1 Coronary Artery Disease

One of the most common forms of cardiovascular disease is coronary artery disease (CAD). CAD is caused by the hardening and blockage of coronary arteries from fatty deposits, known as coronary artery atherosclerosis [1]. Risk factors that lead to the development of CAD include non-modifiable factors, such as male gender, family history of CAD, as well as the modifiable risk factors of hypertension, diabetes, dyslipidaemia, smoking and physical inactivity [2, 3]. Hypertension and dyslipidaemia in particular are two mechanisms that along with the natural process of aging can lead to the development of atherosclerotic plaques in coronary arteries [4].

The abnormal hemodynamic forces from hypertension or natural ageing process can cause damage to the endothelial lining of the arteries [1, 4, 5]. Low-density lipoprotein cholesterol then lodges into the damaged areas in the endothelium. This is exacerbated if there is dyslipidaemia [1, 5]. The accumulated LDL is then oxidised by macrophages. The smooth muscle cells in the arterial wall cause a release of growth factors and cytokines which in turn attract more macrophages [1, 5]. This process accumulates and causes the accumulation of foam cells. The smooth muscle cells then proliferate and an atherosclerotic plaque is formed and continues to grow. This causes an obstruction in the arterial wall which causes more turbulent blood flow, causing even more damage to the endothelial wall and the continual growth of the atherosclerotic plaque [1, 5].

This plaque growth can continue to a stage where it limits or prevents the blood supply to the heart causing oxygen starvation of the cardiac tissue [6, 7]. This can cause angina (chest pain) from a disparity in oxygen supply and demand to the cardiac tissue, or

even myocardial infarction from inadequate oxygen supply causing necrosis of cardiac tissue [6, 7].

Having a diagnosis of CAD is defined as having a history of myocardial infarction, and/or stable angina which are caused by narrowing of the coronary arteries [8]. The diagnosis of CAD also includes those who have also received treatment for CAD in the form of percutaneous coronary intervention (angioplasty/stent) or coronary artery bypass graft surgery [8].

If patients have been diagnosed with angina, myocardial infarction or have had surgical treatment of CAD referral to CR is indicated [2]. Patients with a diagnosis of CAD are referred to CR with the aim of reducing modifiable risk factors for CAD in order to aid with the secondary prevention of cardiac events [9].

1.2 Cardiac Rehabilitation

CR refers to a set of programmes designed to aid in the secondary prevention of cardiovascular disease [9]. Patients can be referred to participate in such a programme by a health professional following cardiac events included in the diagnosis of CAD [2]. Patients who have had valve replacement, heart transplantation or who have chronic heart failure can also be referred to CR [2]. CR programmes have different phases to cater for various needs over the course of recovery from a cardiac event [2].

1.2.1 Phases of Cardiac Rehabilitation

The phases of CR programmes around the world can differ, however there tends to be a general pattern that occurs in three phases; in-hospital, out-patient and maintenance community-based. The in-hospital phase (phase I) occurs one to three days after the cardiac event. During this phase the patient receives care and information from the cardiologist in the hospital about what has happened to the patient and what options are available to them

[2, 10]. The out-patient phase (phase II) follows from the discharge of the patient from the hospital and can continue from eight to twelve weeks after the cardiac event. At this phase of CR the patient receives on-going support and education on how to manage their health at home [2, 10]. The maintenance community-based phase (phase III) of CR occur at three months, or after phase II, post cardiac event and continues as long-term care and maintenance of health behaviours to aid in the secondary prevention of cardiovascular disease [2, 10, 11]. This phase is often exercise-based, and can also provide on-going education about health behaviours to manage cardiac symptoms [11].

1.2.2 Maintenance Community-Based CR

Dunedin has two maintenance community-based CR programmes: The Otago Phoenix Club and Taieri Fit and Fun Group. Members can join either of these programmes at the completion of out-patient CR. It is not compulsory to join either programme and there is no set amount of time for a patient to stay with either programme. These programmes have been designed to offer long-term healthy living support to CAD patients and their spouses.

Both programmes have a twice weekly fitness session lead by an instructor using a variety of aerobic, resistance and flexibility exercises. There are also other events outside of these exercise sessions which involve social aspects organised by the respective committees. The committees from each of the maintenance community-based CR programmes are chaired by the members of the programmes.

1.3 Attendance to Cardiac Rehabilitation

The benefits of attending CR have been established; CR provides improvement in the physical functioning and psychosocial outcomes of attending patients [3]. However, many studies only examine attenders versus non-attenders and therefore the rate of

attendance that produces these results has not been examined as extensively [12-14]. There is also a world-wide problem of low attendance to CR [15].

Initiating health behaviours has been considered easier than maintenance [16]. In terms of CR programmes this translates to approximately 24.8% of patients not attending CR programmes (not adhering to health behaviours) [17]. As a result there can be a high attrition to health-behaviours, such as maintaining physical activity, over long periods of time [18], and in particular approximately a 50% drop off after the first six months on initiation [16, 19]. This trend in decreasing physical activity has also been found post-CR in that 25% of patients were not meeting the recommended physical activity guidelines (>150 minutes moderate to vigorous physical activity/week) three and a half years post-CR [20]. The trend of low adherence to health behaviours is also reflected in attendance to CR programmes in which attrition rates increase as time progresses [21]. Low attendance to CR programmes have been reported from different countries including Australia [22-24], Canada [25-27], Denmark [28], England [29, 30], Ireland [31], Scotland [32] and the United States of America [33]. The issue of low attendance can begin with referral into CR programmes, with one study on cardiac patients in England reporting between 14-35% of all those who are eligible to attend are referred on to CR [29]. This finding is consistent with other studies [28, 34, 35], and from studies and reviews that suggest the average attendance to CR type programmes is approximately 75% of patients [20, 36]. However, there is a trend of decreasing adherence in health behaviours around cardiac health management over time, which has shown to be only 17% of patients adhering to health behaviours over a 24 month period [37], patients only attending 13% of available sessions over a three year period [19], and an estimated only 2.5% of eligible cardiac patients attending long term CR programmes in another study [38]. From the findings discussed above it can be seen that there is a large variance in the adherence to health behaviours

around cardiac health management, however it appears that the trend is that adherence decreases over time.

Although the percentage of eligible patients who attend CR at various stages has been examined, the attendance rate to CR has not been as well examined. Different studies have used different cut-off values to determine which patients are high-attenders, low-attenders and non-attenders [19, 20, 39, 40]. Cut-off values have been based on number of CR sessions that were attended out of the sessions available to them and not taking into account any other extra health behaviours undertaken by the individual. These cut-off values for high-attenders or for completion of the programme ranged from ≥50% attendance [19], ≥60% attendance [39, 40] to ≥80% attendance [20]. Of these studies only the ones with the ≥60% cut-off was examining reasons behind these different attendance rates [39, 40].

Some studies have sought to examine the reasons behind low attendance rate [15, 21-23, 29, 32-34, 41], although most have focused on early stage CR [21, 23, 24, 33, 40, 42]. The Health-Belief Model is a useful tool in examining the reasons behind failure to initiate and/or adhere to health behaviours [43]. The Health-Belief Model therefore could be used to examine the reasons behind low attendance in CR programmes.

1.4 The Health-Belief Model

The Health-Belief Model is a theoretical framework that is designed to examine the reasons behind initiation and adherence rates to health behaviours, such as attending CR [43, 44]. The theory has been derived from psychological theories of stimulus response (people will carry out behaviours that are reinforced) and cognitive theory (the subjectivity of the expectations of reinforcement are what matter the most) [43]. The underpinning theory of the Health-Belief Model is that that patients will carry out health behaviour according to one or both of the following conditions. They value being healthy and

avoiding illness; and/or they expect that carrying out the health behaviour will improve an existing illness or prevent the illness from occurring [43]. To help explain the initiation and adherence to health behaviours this theory has four main constructs including: perceived benefits, perceived barriers, perceived threat and cues to action [43]. The Health-Belief Model also takes into account individual sociodemographic characteristics such as socioeconomic status, age and gender which can have a role in the decision to undergo health behaviour [43]. All of the factors in the Health-Belief Model interact to determine the likelihood that the health behaviour will be initiated or adhered to, this interaction can be seen in Figure 1 [44]. The model is split into three sections: individual perceptions, modifying factors and the likelihood to action. Under individual perceptions is the perceived susceptibility and perceived severity for disease. Under modifying factors are the sociodemographic characteristics of the person, perceived threat and cues to action. And finally under likelihood to action are the perceived benefits, perceived barriers, cost benefit analysis and the likelihood of health behaviour [44].

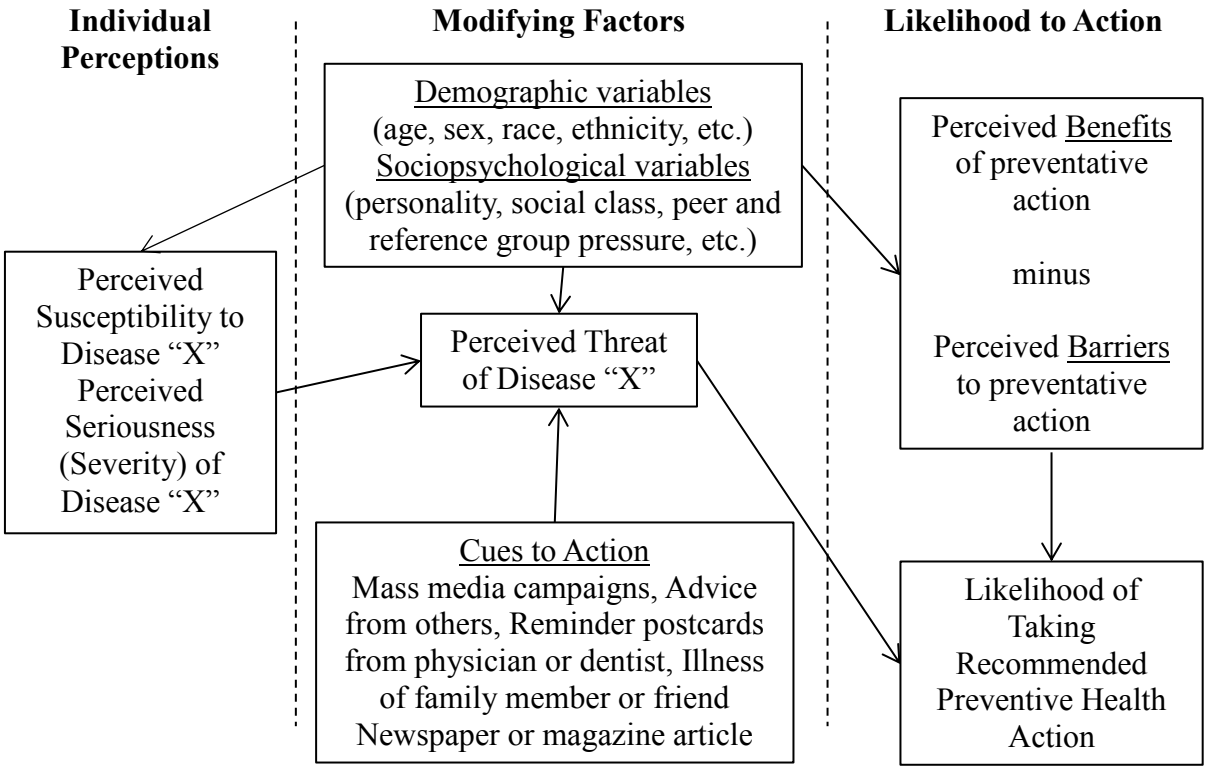

Figure 1. Health-Belief Model
Adapted with permission from Lippincott Williams and Wilkins/Wolters Kluwer Health: [MEDICAL CARE] [44]*, copyright (1975)*

1.4.1 How Factors of the Health-Belief Model Interact

On examination of Figure 1 it can be seen that the sociodemographic characteristics of the individual are central to how the rest of the factors about illness and health behaviour are perceived [44]. The sociodemographic characteristics can have an effect on how the patient views their susceptibility and the severity of the illness and therefore the perceived threat from that illness [44]. Sociodemographic characteristics also impacts on the cost-benefit analysis in which the benefits and barriers to undertaking the health behaviour are weighed up [44]. Cues to action impact on the perceived threat of the illness as encouragement from significant others, media or symptoms of the illness can increase or decrease the perceived threat [44]. The combined perceived threat of the illness and the outcome of the cost-benefit analysis will determine if the health behaviour will be

undertaken or adhered to [44]. In order for the health behaviour to be initiated and adhered to the perceived threat must be high and the cost-benefit analysis must be positive [44].

Chapter Two: Literature Review

CR is a health service that is recognised as a means of secondary prevention for CAD as it can improve patients' current condition and in some cases it can attenuate the progression of further CAD development [3]. This is achieved through both physical and psychological benefits that are obtained through the multi-disciplinary approach [45]. The multi-disciplinary approach involves different health practitioners, such as doctors, nurses, physiotherapists, exercise specialists, nutritionists and counsellors [45]. This approach aids in disease management, attenuation of the progression of disease, improved quality of life, increased exercise, improved diet, coping management, and improved cardiovascular function [3, 30]. It is not known to what extent different attendance rates to CR affects long term benefits as previous studies have examined differences between attenders and non-attenders [12-14]. Also, despite the known benefits attendance to CR is low and this is more so in the maintenance community-based phase, with an estimated 2.5% of all eligible patients attending maintenance community-based CR [38]. Previous studies have examined reasons behind this phenomenon, but these studies are mostly focused on the earlier phases of inpatient and out-patient CR [21, 23, 24, 33, 40]. The issue of low attendance has also been considered to be more of an issue in the elderly population [21].

2.1 Low Attendance to Cardiac Rehabilitation

Despite the evidence of the benefits that attending CR has for CAD patients, there is a problem of low attendance to CR. Reasons for low referral are generally attributed to physicians' lack of encouragement and knowledge about CR programs [29]. Despite efforts to improve referral rates to CR, through endorsing this as a measure of healthcare quality, there is still an issue of low attendance through low participation in CR programmes [42].

Studies have been undertaken previously to try and examine reasons behind this low attendance in order to provide solutions to solve the issue [22-24, 26, 28, 30-33, 35, 40, 46-48]. However a lot of these programmes have focused on early stages of CR programmes including in-patient and out-patient CR [10, 22-24, 28, 30, 31, 33, 40]. This is an issue as examination also needs to consider the maintenance community-based phase as long-term maintenance of aid in the secondary prevention of CAD [2, 26]. Analysis of reasons behind low attendance or non-attendance to maintenance community-based CR also needs to consider a range of factors, as the decision to attend CR programmes is complex [23, 40].

2.2 Use of the Health-Belief Model with Cardiovascular Disease Patients

The Health-Belief Model has been used in various ways within the wider cardiovascular disease population [49]. It has been used as a model to help understand the reasons behind decisions to initiate and adhere to health behaviours related to cardiovascular treatment [50-52]. Health-Belief Model has also been utilised as a way of creating an intervention to encourage undertaking of a health behaviour for cardiovascular treatment [49, 53]. The Health-Belief Model is one way of thinking about reasons behind initiation and adherence to health behaviours as opposed to decisions being solely based on knowledge [50]. This is because the Health-Belief Model takes into account the persons beliefs about their illness and treatments and places them in an active role for their decision making [43, 50]. This is different from models which view decision making based on providing the person solely with information to aid in initiation of the health behaviour, which places the person in a passive role [50].

A study shows the usefulness of the Health-Belief Model for predicting cardiovascular disease patients initiation to CR programmes [51]. There have been associations with high perceived benefits and adherence to CR exercise regimes [51]. Factors that have been associated with CR initiation and adherence match to the Health-

Belief Model factors of the perceived threat, cues to action (referral from a physician) and sociodemographic characteristics (age, gender, education level and socioeconomic status) [51].

The Health-Belief Model has been used in previous studies as a tool for promoting health behaviour in a cardiovascular disease population [49, 53, 54]. Three studies have found that using the Health-Belief Model to promote health behaviours through identifying barriers, talking through strategies and changing attitudes towards the treatment was more effective than providing solely information on treatment [49, 53, 54]. The differences in providing this extra support meant that the patients were influenced to undertake the health behaviour and ultimately had better outcomes for their recovery [54]. It has also been suggested that using this approach will aid in influencing at risk groups to undertake health behaviours [53].

The Health-Belief Model has already been used in previous studies examining CR initiation for cardiovascular disease patients, however there have been inconsistent findings, including inconsistencies on the role of perceived severity and susceptibility in CR initiation and adherence [52]. This is primarily due to researchers developing their own questionnaires to examine each of the factors of the Health-Belief Model or missing out sections entirely [52]. Therefore use of validated questionnaires would need to occur to determine the validity of the Health-Belief Model factors at determining the reasons behind maintenance community-based CR adherence for CAD patients.

2.3 Individual Perceptions

This section of the Health-Belief Model involves the patients' perceptions of their own health, which marks the start of the patients' readiness to undertake a health-behaviour [44]. As the patient must first perceive that there may be a possible need for the health-

behaviour (presence of a perceived threat) in order for the decision process to go any further [44].

2.3.1 Perceived Threat

Perceived threat is formed from the person perceived susceptibility and perceived severity of the illness. Susceptibility refers to the person beliefs as to the likelihood of contracting the illness, whereas the severity is the persons perceptions as to how serious the illness is once contracted or if left untreated [43, 44]. Only perceived severity was focused on for the current study as all the patients have a diagnosis of CAD and therefore perceived susceptibility is irrelevant. Perceived severity will affect compliance with a health-behaviour if the patient views their illness as severe enough to have serious physiological and/or social repercussions [44]. Patients' perceived severity of CAD has been studied and found to have an effect on the likelihood of attendance to CR programmes [30, 40, 55-58]. Those who viewed their condition as having severe consequences and symptomatic, as well as having an understanding of their condition and viewing it as controllable are people who are more likely to attend CR [58]. As only perceived severity will be examined in the current study, this variable will now only be referred to as perceived threat.

2.4 Modifying Factors

Modifying factors are that which affect health perceptions. These modifying factors include demographic factors and cues to action [43]. These factors can shape the perceptions around health and the health-behaviour and can be both internal and external triggers [44].

2.4.1 Sociodemographic Characteristics

Demographic factors can influence the likelihood of behaviour change as it can indirectly influence a persons' perception of the benefits, barriers and risks to initiating or adhering to health behaviour [44]. Demographic factors have been associated with low attendance to CR programmes in previous studies findings [21, 23, 33, 35, 46, 56, 59, 60]. These factors include older age [33, 59], female gender [33, 56], minority ethnicities [60], lower socioeconomic status [46], lower education levels [46], patients with angina [21], and those without spousal support [46]. Therefore it is important to examine factors such as age, gender, ethnicity, martial, education and socioeconomic status, as well as medical history when considering reasons for different attendance rates to maintenance community-based CR. As knowing if there are any differences in demographic factors can aid in understanding who is likely to attend and the possibility of needing to target certain populations to increase attendance rates to maintenance community-based CR programmes.

2.4.2 Cues to Action

In the Health-Belief Model, cues to action are factors that encourage the initiation or adherence to health behaviour. These factors can be anything from internal factors, significant others, media, societal expectations and the environment, as long as the cue is relevant to the person and facilitates the initiation or adherence to the health behaviour [43, 44]. Cues to action are particularly relevant in cases where perceived threat and barriers are high and the benefits are low [43].

Previous studies investigating reasons behind attendance rates to CR programmes have found many factors that can affect attendance [21, 22, 32, 33, 46-48, 61-63]. These factors have either actively encouraged attendance, or a lack of the factor has been linked with low or no attendance. These factors include health-professionals support [21, 32, 61-63], education about CR [32, 33, 47, 63], social support [62, 63], family/spousal support

[22, 46, 62] and self-motivation [32]. Financial issues are a factor which is often described as a discouraging factor to attending CR programmes [47, 48, 62], due to issues around medical insurance.

Previous studies have shown that there are some factors that can trigger encouragement to CAD patients to attend CR programmes [21, 22, 32, 33, 46-48, 61-63]. However, the factor of financial issues have been shown in some factors to discourage attendance to CR programmes [47, 48, 62]. This shows the importance of considering cues to action as possibly being both positive and negative in their encouragement to attend maintenance community-based CR programmes.

2.5 Likelihood to Action

This section of the Health-Belief Model involves the patients' evaluation of the health-behaviour, in that what are the benefits that could be obtained from undertaking the behaviour, and what are the possible barriers [44]. Patients' must first be at a high stage of readiness (high perceived threat and receiving encouraging cues to action), before a the perceived benefits and barriers can have an effect on the decision to comply with a health-behaviour [44].

2.5.1 Perceived Benefits

In the Health-Belief Model, perceived benefits refers to the outcome expectations that the person has that undergoing the health behaviour will produce. These factors will facilitate the initiation or adherence to health behaviour if they help to out-weigh any perceived barriers or perceived threat [44]. In conjunction with the perceived barriers, these factors help form a cost-benefits analysis for the person as to whether partaking in the health behaviour is worthwhile [43]. When examining CR programmes the main focus has

been on the measureable benefits [3, 12, 13, 25, 64-66], rather than the perceived benefits [21, 25, 35, 40, 63].

Previous studies have found measureable benefits from attending CR programmes that include a reduction in the risk factors of CAD [3, 12, 13, 25, 64-66], improvement in cardiovascular functioning [12], increase in physical activity level [12], improved ability to carry out activities of daily living through improved cardiovascular fitness [13], improved muscle strength [25], reduced waist circumference [67] and improved cardiovascular responses to exercise [66].

However, perceived benefits to attending CR programmes has also been studied [21, 25, 35, 40, 63]. The perceived benefits gained from attending CR programmes have included receiving education about self-management of CAD [35], improved quality of life [35], improve psychological well-being [35], a social support network [25, 40] being able to share their experiences with like-minded people [40], access to expertise from health-professionals [40], as well as CR providing a variety of exercise routines and enjoyment [63].

[3, 12, 13, 25, 64-66]. However, other studies have also shown there are perceived benefits to attend CR programmes, which appear to effect attendance rates [21, 25, 35, 40, 63]. Therefore it is important to consider both when examining CR programmes as both measured outcomes and perceived benefits could affect attendance to maintenance community-based CR programmes.

2.5.2 Perceived Barriers

Perceived barriers refer to the perceived obstacles that inhibit initiation or adherence to health behaviour. These factors can prevent a person from initiating or adhering to health behaviour if they are perceived to be greater than the perceived benefits and if the perceived risks of not doing the health behaviour are not as high [44].

As there is an issue of low attendance [21], many studies have examined what some of the possible barriers that are causing this low attendance [22-24, 26, 28, 30-33, 35, 40, 46-48] in the hope of being able to address these issues. Previous studies have found that factors such as transportation issues [22-24, 32, 33, 35, 46, 47], lack of referral [22, 31-33, 35, 40], perceiving no need for CR [23, 30, 31, 33], the structure of CR programmes [23, 30, 31, 40, 46], financial issues [26, 35] and comorbidities [28, 31, 40, 48] are seen as barriers to attending CR programmes.

Previous studies have shown that there are many factors which are perceived to be barriers to attending CR programmes [22, 23, 33, 35, 40]. Therefore perceived barriers are also another important factor to consider when examining reasons behind attending maintenance community-based CR programmes. This could then lead on to the development of interventions to improve attendance to maintenance community-based CR [21, 23, 25, 35, 40].

2.5.3 Cost-Benefit Analysis

The cost-benefit analysis is where the patient considers the perceived threat along with sociodemographic characteristics and cues to action, and compares this to the benefits, minus the barriers of attending, in order to decide whether or not to undertake a health behaviour [43]. Previous studies have found that there is a decisional balance that patients make when deciding to attend CR programmes in that if there are more barriers [23, 68] or a perceived lack of benefits, then attendance is low [40, 69].

2.6 Summary

CR is an effective programme for secondary prevention of cardiac events for patients with coronary artery disease [2]. This is because the multi-dimensional approach of CR programmes provides physical and psychological benefits which can reduce the risk

factors for CAD, improve cardiovascular functioning and improve overall quality of life [9]. However, as there is an issue of low attendance to CR programmes [42], and in particular to the maintenance community-based phase of CR [38]. Examination of the reasons behind the low attendance rate needs to be undertaken, and can be achieved through the use of the Health-Belief Model. Knowing the reasons behind low attendance to the maintenance community-based phase of CR can aid in creating strategies that can then be used to facilitate and encourage optimal levels of attendance to this phase of CR [42]. This will aid in the long-term continuation of the health-behaviours of CR to provide long-term secondary prevention for CAD patients.

2.7 Purpose of the Current Study

The aim of the current study was to examine the reasons and outcomes of different attendance rates (≥60% of sessions, <60% of sessions, and not registered over a one year period) to maintenance community-based CR programmes within Dunedin, using the Health-Belief Model as the theoretical framework. The attendance rate cut-offs were chosen to reflect those used in studies conducted in Scotland examining patient choices and experiences around phase II CR programme [39, 40]. Patients had their perceived severity of CAD, sociodemographic characteristics, cues to action, perceived benefits and perceived barriers surveyed to determine the reasons for different attendance rates.. It was hypothesised that the current study would find the following with reasons for attending maintenance community-based CR:

1. Individuals with a higher attendance rate to maintenance community-based CR (≥60% of sessions) will have a higher perceived threat of their CAD compared to low-attenders and non-registered patients

2. Individuals with a higher attendance rate to maintenance community-based CR (≥60% of sessions) will perceive encouragement to attend from cues to action compared to low-attenders and non-registered patients, whereas low-attenders and non-registered patients will perceived some factors as discouraging
3. Individuals with a higher attendance rate to maintenance community-based CR (≥60% of sessions) will perceived more benefits to attending maintenance community-based CR compared to low-attenders and non-registered patients
4. Individuals with a higher attendance rate to maintenance community-based CR (≥60% of sessions) will perceived less barriers to attending maintenance community-based CR compared to low-attenders and non-registered patients
5. Individuals with a higher attendance rate to maintenance community-based CR (≥60% of sessions) will have higher physical functioning scores, a higher physical activity level and better quality of life compared to low-attenders and non-registered patients

Chapter Three: Methods and Procedures

3.1 Design

This study was a cross-sectional study, in which participants were required to attend one testing visit at the School of Physical Education, Sport and Exercise Sciences and complete a 7-day physical activity assessment. The study visit took approximately 90 minutes and required the participant to complete questionnaires and physical functioning assessments with the aid of the researcher. After this the participant was required to complete measurement of their physical activity levels by wearing an accelerometer for seven consecutive days. Once the accelerometer was returned the participant had completed the study.

3.2 Participants

Both male and female participants, residing within the Dunedin/Mosgiel area, whom had a diagnosis of CAD and were ≥60 years, were invited to participate in the study. Participants were then selected based on their attendance rate to one of the two maintenance community-based CR programmes in Dunedin over the past year, which was used to create the three study groups. These three groups were based on cut-offs used in previous studies examining differences in patient experience to CR programme [39, 40]: high-attenders (HA ≥60% of sessions), low-attenders (LA <60% of sessions), and non-registered (NR completed out-participant but did not registered for maintenance community-based CR). Attendance rate was calculated as a percentage of the number of sessions attended divided by the number of sessions available going back 12 months from the testing date, or going back until the participant first registered if less than 12 months. All participants in the HA and LA groups have been registered at the maintenance community-based CR programmes

for at least 6 months and therefore attendance rate was calculated based on between 6 to 12 months of possible attendance.

Any male or female participants were eligible to partake in the current study if they were ≥ 60 years, had a diagnosis of CAD and had completed out-participant CR. Participants were eligible for the high-attender and low-attender study group if they were a current member of one of the Dunedin/Mosgiel maintenance community-based CR programmes. Participants were eligible for the non-registered study group if they had treated for CAD in the Dunedin Hospital between January 2009 and December 2011 and had not registered for either of the maintenance community-based CR programmes. A diagnosis of CAD included a history of angina, myocardial infarction, atherosclerosis, heart failure or having had coronary artery bypass surgery, angioplasty or stenting, valve surgery or a heart transplant.

Participants were not eligible to partake in the study if they had any contraindications to completing the six-minute walk test. These included unstable angina and/or a myocardial infarction during the previous six months to testing, a resting heart rate greater than 120 beats per minute and a resting systolic blood pressure more than 180 mmHg and diastolic blood pressure of more than 100 mmHg [70]. Participants were also ineligible if they have had a stroke and were unable to move safely independently, as well as those who required the use of a wheelchair (use of a walking cane was acceptable if they could move around independently and safely). Participants were not recruited if they had any unstable coronary conditions which had them hospitalised within the last six months before testing.

Recruitment of the participants for this study was conducted in two different ways. Recruitment for participants in the high-attenders and low-attender study groups was carried out through presentations at the maintenance community-based CR programmes or from information collected from a previous CR study. The presentations were held at the

maintenance community-based CR programmes of the Otago Phoenix Programme and Taieri Fit and Fun Group. At these presentations information was given on the study aims and requirements and information packs containing the information sheet and consent form here handed out to anyone who was interested to find out more information. Other potential participants who would be categorised into the high-attenders and low-attenders study groups were contacted by telephone or email based on information gathered from a previous CR study. The previous study was conducted in the CR research laboratory at the School of Physical Education, Sport and Exercise Sciences, University of Otago and asked participants of their interest to be contacted to partake in future studies. Potential participants who were eligible and indicated their interest to be involved in future studies were contacted and were sent a paper copy of the information pack via mail if requested.

Recruitment of participants for the non-registered study group was targeted. CAD participants who were managed in Dunedin Hospital between January 2009 and December 2011 regardless if they participated in phase II CR at the Dunedin Hospital were invited to partake in the study. These participants were identified by a cardiology nurse and sent a letter and the information pack from a cardiologist. The letter clearly stated that any involvement in the study was entirely voluntary and would not affect any future healthcare.

Potential participants then contacted the researcher via telephone email or mail to state their interest in volunteering for the study. Participants who were then willing to partake gave their written informed consent prior to participating in the study. Ethics approval for this study was obtained from the University of Otago Ethics Committee. Participants did not receive any external rewards for their participation, however they did receive information on their physical functioning and physical activity levels at the completion of their involvement in the study.

3.2.1 Setting of Maintenance Community-Based Cardiac Rehabilitation Programmes

Participants for the HA and LA groups were recruited from either the Otago Phoenix Club or Taieri Fit and Fun Group. These are both phase III maintenance community-based CR programmes situated within the greater Dunedin area, Otago, New Zealand. Both provide on-going exercise support in which participants have full control as to whether to register and/or attend as they feel they need to.

In New Zealand the healthcare system provides subsidised services across the public sector, including cardiac rehabilitation programmes. Through this subsidy the programmes are able to function with a nominal amount of membership funding.

The Otago Phoenix Programme costs members $20 for the full year which provided them with access to the twice weekly 1 hour exercise classes in the gym and/or to the table tennis room. For an additional fee participants can choose to use the Physiotherapy pool located at the hospital to undergo their own swimming routine under the supervision of a trained physiotherapist. Other activities run outside of this may have an additional cost that members can choose to opt into.

The Taieri Fit and Fun Group costs members $2 per exercise session they attend. Any additional activities run by the group outside of the exercise sessions may have an additional cost that members can choose to opt into.

3.3 Outcome Measures

The independent variable for the study was the attendance rate or non-registration to one of the maintenance community-based CR programmes in the Dunedin/Mosgiel area. The main outcome measures for the current study were the four factors of the Health-Belief Model (perceived threat, cues to action, perceived benefits and perceived barriers) and physical functioning/physical activity level assessments. These provided the framework for the examination of the reasons and outcomes of attendance to maintenance community-

based CR. The secondary measures included anthropometric, socioeconomic status and distance to the nearest maintenance community-based CR programme. Measurement procedures used for each of the variables are discussed as sections for the Health-Belief Model, with both reason and outcome variables combined.

3.3.1 Attendance Rate to Maintenance Community-Based Cardiac Rehabilitation

Attendance rate and registration were determined through examination of the attendance records from the Otago Phoenix Programme and Taieri Fit and Fun Group. Verbal permission was obtained from the Presidents of each of these maintenance community-based CR programmes to have access to these records. Permission was also granted from the participants, via the consent form, to examine their personal attendance records. Attendance records are maintained by members of the Otago Phoenix Programme and Taieri Fit and Fun Group. Before the start of each session a member checks off names at the front door to create a list of attendance rates each year. These records are held by the presidents of the respective programmes. This data was then entered into an excel database by the researcher to enable analysis of attendance rates of the participants involved in the current study. Attendance rate was determined by finding the percentage of sessions attended compared to number of sessions available one year from the testing date. In cases where the participant joined the programme less than one year from their testing date attendance was taken from percentage of sessions attended against number of sessions available between when they joined the programme and their testing date. Participants who registered to the programme less than 6 months from proposed testing date were not included in the study.

3.4 Reasons & Outcomes Variables

All the questionnaires used in the current study were completed with the aid of the researcher. This involved the research giving the participant the Likert scale on which to base their answers on while the researcher read out each statement at a time. For the open-ended questions the participant was asked the question and were given time to freely give their answer while the researcher recorded this on the paper. No voice recording devices were used for this study.

The structure for the testing was carried out in the following sequence, beginning with a welcome and introduction to the study and allowance for any questions or chance to pull out of the testing. The participant was fitted with their heart rate monitor. The participant completed the contact information, sociodemographic characteristics and medical history sections of the questionnaire with the aid of the researcher. The participant then had their resting blood pressure and heart rate measured, followed by waist and hip circumferences and finally height and weight. The participant then went for their first six-minute walk test. This was followed by the undergoing of the physical functioning tests of upper body strength, balance, gait speed and chair to stand tests. The participant completed the revised illness perception questionnaire, multidimensional outcome expectations for exercise scale, cardiac rehabilitation barriers scale, cues to action and SF-36 questionnaires with the aid of the researcher. The participant then completed the second six-minute walk test. The final stage was the set-up and instructions on how to use and return the accelerometer, completing the testing visit.

3.4.1 Perceived Threat

Perceived threat was measured through the use of the Revised Illness Perception Questionnaire (IPQ-R) (Appendix B) [71]. This questionnaire has been used with a post myocardial infarction population based in New Zealand and found to have test-retest

reliability (correlations ranging from 0.46 to 0.88) as well as being more psychometrically acceptable and comprehensive than the original Illness Perception Questionnaire [71].

The IPQ-R questionnaire consisted of 38 questions concerning views on illness and 18 questions concerning causes of the illness [71]. From this questionnaire only the sections of timeline acute/chronic (IP1-IP6; IP18), timeline cyclical (IP29-IP32), consequences (IP6-IP11), personal control (IP12-IP17), and treatment control (IP19-22) [71] were examined, as these were the most relevant sections to the study. The IPQ-R was designed to examine personal beliefs about participants' current illness. An example of a statement that asked the participant about their views on their illness included "My illness is likely to be permanent rather than temporary" [71]. Participants could choose from a 5-point Likert scale as to how they felt about each statement (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree or 5= strongly agree). The response given by the participant responded to a score given to each participant [71].

3.4.2 Sociodemographic characteristics

Participants' demographic information (age, gender, ethnicity, marital status, education level, and medical history) was obtained through questionnaires (Appendix B). These questionnaires were completed by the participant with the assistance of the researcher.

Participants' physical living address was used to determine distance to the nearest maintenance community-based CR programme via Google maps as well as determine the socioeconomic status of the suburb they reside in via the New Zealand deprivation scale [72]. Google maps provided an estimation of distance to travel by car in kilometres (to the nearest 0.1 km). The New Zealand Deprivation Scale is a numeric value given to suburbs in New Zealand based on eight different measures of deprivation and the findings of the 2006 census [72]. The number ranges between 1 and 10 where 1 equates to areas with the lowest

deprivation and a score of 10 equates to areas with the highest deprivation. Participants were assigned a deprivation score according to the suburb of their living address.

3.4.3 Cues to Action

Cues to action were another part of the Health-Belief Model in which participants received cues from the people or events in their life that encouraged them to carry out health behaviour[43, 44]. In the present study participants were asked how much of an effect certain known cues to encourage attendance to maintenance community-based CR affected their decisions around attendance.

Cues to action were measured through the use of the cues to action questionnaire (Appendix B). This questionnaire allowed participants to choose from a 5-point Likert scale (1= strongly discourages me, 2= discourages me, 3= neither encourages nor discourages me, 4= encourages me, 5= strongly encourage me) as to which of the 12 factors were the most influential in their choice to attend or not attend maintenance community-based CR. The 12 factors were based on previous findings of influential factors to attending CR [22, 25, 62]. An example of a cue to action factor included "worry about my health" [62]. Question 13, "other" was an open-ended question in which participants could mention any other factors that influenced their decision to attend or not attend maintenance community-based CR. This questionnaire was designed specifically for the present study using cues that had been indicated in previous studies to have an impact on attendance to CR programmes [22, 25, 62]. These included family support, follow-up contact, participant workbooks [22] and symptoms/fear of another cardiac event [62].

3.4.4 Perceived Benefits

In the Health-Belief Model, perceived benefits are the participants perceptions of beneficial outcomes they will obtain from partaking in a health behaviour, or in this case,

the perceived benefits that participants will obtain from attending maintenance community-based CR [43, 44]. The CR programmes examined in the current study both have a high exercise training component and therefore perceived benefits in attending could be considered similar to that of perceive benefits in undertaking exercise. The multidimensional outcome expectations for exercise scale, is a questionnaire designed to examine the outcome expectations of undertaking regular exercise. This scale examines outcome expectations of exercise through the three aspects of physical, social and self-evaluative areas. This scale has been validated and has found differences in outcome expectations of the scale by accordance to physical activity level, age and health status [73]. It has therefore been deemed as an appropriate scale in determining differences in the perceived benefits of attending maintenance community-based CR.

Perceived benefits were measured using the Multi-dimensional Outcomes Expectations for Exercise Scale (MOEES) (Appendix B) [73]. This questionnaire has internal consistency and validity with median ICC ~.82 [73]. This questionnaire consisted of 15 possible outcomes of exercise in which participants could give an answer from a 5 point Likert scale (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree or 5=strongly agree) as to how much they expected to see that benefit [73]. An example of the possible benefits included "Exercise will improve my ability to perform daily activities" [73]. This questionnaire had been modified, with permission from the authors, so that the instructions read "The following items reflect your beliefs or expectations about benefits of regular attendance to Community-Based Cardiac Rehabilitation" rather than "benefits of regular exercise or physical activity. The start of each question was also modified from "exercise will…" to "attending community-based Cardiac Rehabilitation will…"Question 16, "Other benefit(s) from attending a cardiac rehabilitation program", was an open-ended question which allowed participants to state

any other benefits they expected to obtain from attending maintenance community-based CR.

3.4.4.1 Measured Benefits – Outcomes of Attendance

Measures of physical functioning are useful as they can aid in the indication of disability [74-76]. They also can be administered to determine if the physical benefits that were mentioned in the literature review do occur from attending maintenance community-based CR programmes [77]. The tests discussed have therefore been found to be both safe and reliable measures to determine the benefits of attending CR programmes (Appendix B).

Anthropometry and Haemodynamic Values

Anthropometric data was obtained through the use of standard measuring tools. A standiometer was used for measuring for height in centimetres to the nearest 0.1 cm. Participants were instructed to stand with their arms at their side, feet close together and chin parallel to the floor. Digital scales were used for measuring weight in kg to the nearest 0.1 kg. Participants were instructed to stand with weight even across both feet and looking ahead, the measurement was recorded once the scales stopped changing. Both of these measurements were only taken once and recorded for analysis.

A measuring tape was used for measuring the hip and waist circumferences in centimetres to the nearest 0.1 cm. The waist circumference was taken from the point of the minimal waist. The hip circumference was measured from the widest portion of the buttocks. The placement for both ensured that the tape was parallel to the ground and fitted tight to the body without constriction. During measuring the participants were instructed to remain upright, with both feet close together, weight spread evenly across both feet and to relax the abdomen [78]. Measurements were only taken once for each of the waist and hip circumferences.

Resting haemodynamic measures were taken when the participant had been in a seated position for at least 5 minutes. Blood pressure was measured using an Omron automatic blood-pressure cuff. The cuff was wrapped around the participants' upper arm and aligned with the brachial artery. Measurements occurred twice and were averaged. If measurements had a difference greater than 5 mmHg then the measurement occurred again [79]. Heart rate (bpm) was measured using a Polar heart rate monitor. Resting heart rate was taken once after the blood pressure measurements while the participant was still in a seated position.

Physical Functioning

A measure that aids in determining the physical functioning of people is the Short Physical Performance Battery [74]. This test involved gait speed, balance and chair to stand tests which are designed to measure lower limb functionality [74]. It does this by assigning a score for each test based on the quality on which it was performed and this gives an overall score stating the persons' lower limb functionality [74]. Scores from this test have been shown to be associated with disability to carry out activities of daily living [74].

The balance tests had various stages of difficulty ranging from standing with both feet together for 10 seconds (side by side), standing with feet in a semi-tandem position for 10 seconds (semi-tandem) and standing with feet in tandem position for 10 seconds (tandem). If at any stage the participant could not complete a certain level then the balance test would be completed with the participant receiving zero scores for the subsequent balance tests [74].

The gait speed test involved the participant to walk at their normal speed between two cones which had been set 4 meters apart; the time taken to walk between the two cones was measured [74].

The chair to stand test involved the participant sitting on a chair with their feet flat on the floor shoulder width apart and their arms folded across their chest so that their hands were on opposite shoulders (left hand on right shoulder). The participant was instructed that they needed to stand up from the chair into a fully erect standing position without moving their arms from the starting position and then sit back down in the chair once again without moving their arms to complete one chair to stand. Participants were instructed that they needed to do this task five times, as fast as they could, while being timed [74].

Each of the above tests were scored out of four, meaning that participants could receive a total score of twelve on completion of the short physical performance battery. A score from 10 to 12 out of 12 indicates good physical functioning, where as a score from 4 to 7 out of 12 indicates some form of activities of daily living disability [74].

Lower Body Strength

Strength is an indicator of ability to carry out activities of daily living and therefore assessing the ability for elderly to live independently [75]. The 30-second chair to stand test is a safe and valid test for adults over 60 years of age as it can show differences in performance between low and highly physically active individuals and the decline with age [75].

To measure the participants' lower body strength the 30-second chair to stand test was used. This test involved the same technique of chair to stand as in the short physical performance battery. However the participant was instructed to carry out the same movement as many times as possible within the 30 second period starting from when they were ready. This test was carried out twice, to allow for a practice trial, with the participant having at least 5 minutes rest between both trials. The trial that produced the most completed chair to stand movements was used for analysis [75].

Upper Body Strength

Measuring upper body strength is also another way of assessing physical functioning, and this can be determined through use of the hand-grip test [76]. Outcomes of this test have been found to have associations with all-cause mortality, including cardiovascular disease in elderly [80]. It has also been recommended as an essential tool for measuring frailty and therefore screening elderly in clinical settings [81]. Also attendance to CR programmes has been found to improve strength over a six-week period [77].

The hand-grip test used a Lafayette Model 78010 dynometer to measure upper body strength in force kilograms. The participant was asked what their dominant hand was before starting the test. Test measurements were then recorded as from either the dominant hand, or non-dominant. The participant was required to sit in a chair with their feet flat on the ground shoulder width apart. They were then instructed to hold the dynometer in their hand, their elbow bent at 90 degrees and their shoulder and forearm in a natural position ensuring that their wrist is in a neutral position. In this position the participant was instructed to squeeze the dynometer as hard as they could. The measure was then recorded by the researcher and the dynometer was placed into the participant's other hand where the task was repeated [76]. This test was performed three times for each hand [80], the highest value obtained for each hand was combined to determine the hand-grip index.

Six-Minute Walk Test

One way of measuring fitness and therefore, in an indirect way, of measuring cardiovascular functioning is through administration of the six-minute walk test. The six minute walk test is a clinical test used to assess the submaximal cardiorespiratory fitness and therefore functional capacity to carry out activities of daily living, in participants with various diseases [70]. As it requires the individual to walk at a self-selected pace it is suitable for elderly participants, and those with CAD (with controlled symptoms) [70]. It

has also been found to show differences in functional capacity of those who attend CR and those who do not [77].

For the six minute walk test the participant walked around a 50-meter circuit with a cone in each corner marking out the walking circuit set in the gymnasium. The participant had to ensure that they went around each cone and not simply to it. The participant walked continuously in this circuit for 6 minutes as fast as they could, and they were allowed to change this speed as long as it still remained a walk and did not become a jog. The researcher counted the number of times the participant completed a full 50 meter loop and at what meter mark the participant was at after the 6 minutes, in order to calculate the total distance travelled (m). The researcher also measured the participants' perceived exertion (Borg 10-point scale) and heart rate, in beats per minute, at the start of the test, every minute during the test, and at the 1 minute and 2 minute post-test recovery period. Blood pressure, measured in millimetres of mercury, was measured before the test as the resting value and 1 minute post-test. This six-minute walk test was administered twice, with at least a 60 minute break between both of the tests.

Physical Activity Level

Physical activity level is another measure of functional capacity, and is important when considering disease prevention, management and regression [82]. It is also important to consider the physical activity levels of those who are attending CR as one of the aims of the programme is to promote healthy lifestyle behaviours [13]. There are many different ways to measure physical activity level from self-reported questionnaires to objective measures such as doubly labelled water and accelerometers [82]. Use of an accelerometer has advantages in that it is an objective measuring tool, it can be used over several days to give details on habitual activity levels and it is easy to use [82, 83]. It has been found that individuals over 65 years of age overestimate their energy expenditure in self-reported

means, compared to the data collected by objective physical activity measurement tools [84]. Therefore using an accelerometer to measure physical activity levels in elderly is a more accurate than self-report and an easy measurement tool to use [82, 84].

Physical activity level over a 7-day period was measured through the use of an Actilife accelerometer (GT3X+). The participant was instructed on how to wear the accelerometer on their waist, adjusting the waist band as needed. The participants were told to keep the accelerometer on for a seven consecutive day period, only taking it off when getting wet (shower, swimming, splash back from cleaning chores) or sleeping. The accelerometer measured and stored data on the time spent undertaking activities of certain intensities based on metabolic equivalents (METs), energy expenditures (kCal) and steps. The data was collected as time spent, in minutes, in activities that were of a moderate or higher intensity (≥ 3 METs), total activity energy expenditure (kCal/week) over the 7-day period, and steps per day. Analysis then involved several parts, including average time spent in moderate to vigorous intensity physical activity per day, total energy expenditure, average steps per day, as well as the average number of days that the participant meet the minimum physical activity guidelines for moderate to vigorous intensity activity (≥ 30 minutes per day) and steps (≥10,000 steps per day). The study groups were analysed as to the percentage of participants who were considered as active according to moderate to vigorous intensity physical activity (active = ≥30 minutes on 5 or more days) total energy expenditure (active = 1000 to 1999 kCal/week, very active = ≥2000 kCal/week) and steps (active = ≥10,000 steps on 5 or more days).

Quality of Life

The Quality of Life short form (SF-36 v2) was designed to assess subjective notions of physical and psychological well-being in clinical practice and research [85]. This assessment has been used in a CR setting and been found to be a more appropriate measure

of the psychological benefits and social well-being of the participants compared to other measurement tools [86]. The SF-36 v2 questionnaire consisted of 36 items in which participants answered using Likert scales to determine their perceived mental and physical health and was filled out with the aid of the researcher.

3.4.5 Perceived Barriers

Perceived barriers in the Health-Belief Model referred to the factors that prevent participants' from carrying out healthy behaviours, or in this case, the factors that prevented the participants from attending maintenance community-based CR [43, 44]. The Cardiac Rehabilitation Barriers Scale (CRBS) has been found to be psychometrically valid with an ICC of .64 [87] and it contains barriers that have been found to be common for elderly cardiac participants [88]. Therefore perceived barriers were measured through the use of the CRBS (Appendix B) [87]. This questionnaire consisted of 21 factors that are common barriers to attending CR as found in the previous literature in which participants had a choice of five Likert scaled answers (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree or 5= strongly agree) as to how much the factor affected their attendance [87]. An example of a barrier included in the questionnaire included "I did not attend a cardiac rehabilitation program, or if I did attend, I missed some sessions because of transportation problems (e.g. access to car, public transportation)" [87]. The analysis of the test scores consisted of a total mean outcome of questions one to twenty one, as well as subscales of need/health care (didn't know about CR; don't need CR; doctor did not feel it was necessary; many people with heart problems don't go, and they are fine; I can manage my heart problem on my own; I think I was referred, but the rehab programme didn't contact me; took too long to get referred and into the program; I prefer to take care of my health alone and not in a group), logistical (distance; cost; transportation problems; family responsibilities; severe weather), work/time (travel; time constraints; work responsibilities)

and comorbidities (find exercise tiring or painful; I don't have the energy; other health problems prevent me from going; I am too old).

Question 22, "Other reason(s) for not attending a cardiac rehabilitation program", was an open-ended option in which participants were allowed to mention any other factors that affect their attendance to maintenance community-based CR.

3.5 Data Analysis

Both quantitative and qualitative data were collected and analysed for the primary objectives of reasons for attending maintenance community-based CR. Perceived threat, benefits, barriers and cues to action variables were analysed and compared between the three study groups of HA, LA and NR Only quantitative data were collected for the secondary objectives of outcomes to attending maintenance community-based CR. Physical functioning, physical activity level and physical and mental health were analysed and compared between the three study groups of HA, LA and NR. For the quantitative data analysis the IBM SPSS statistical software package, version 19 was used, whereas the qualitative data was analysed using the general inductive approach [89].

3.5.1: Quantitative Data Analysis

The questionnaires of IPQ-R, CRBS, MOEES and SF-36v2 had their summary scores computed in accordance to the authors' guidelines. These scores aided in the examination of perceived threat, barriers, benefits and mental and physical health. There were no issues of missing responses as the examiner was guiding the participants through each questionnaire and the participants were informed that there were no wrong choices and to choose the most appropriate answer.

Demographic information for each of the three study groups was analysed by Chi-Square test to determine if there were any statistically significant differences in the

categorical variables. The continuous demographic data of age and anthropometry measurements were analysed using one-way ANOVA.

One-way ANOVA analysis was also carried out for each of the main outcome measurements of perceived threat, perceived barriers, perceived benefits, cues to action, physical activity level, physical functioning and overall quality of life as well as the secondary measurements of distance to CR and socioeconomic status. A post-hoc Tukey was conducted to determine which of the three study groups, high-attenders, low-attender or non-registered, had the statistically significant difference for a given outcome measurement. Differences between the three groups' results were considered statistically significant if the p-value was < 0.05.

3.5.2: Qualitative Data Analysis

At the end of the questionnaires of cues to action, MOEES and CRBS there were open-ended questions that allowed the participants to make any additional comments were examined using the general inductive approach [89]. This involved the analysis of key terms or themes from comments given from each of the participants. These themes were first developed at an individual level, and then collated into common themes within each of the three study groups. These themes were then examined across all three study groups to see where common terminology could be used to show where similar themes were occurring across the three study groups.

Chapter Four: Results

A total of 44 CAD patients were recruited for the current study and assigned into one of three groups according to attendance rate to maintenance community-based CR programmes: HA (n=11), LA (n=16), and NR (n=17). The average long-term attendance of the participants to the maintenance community-based CR programmes examined were 4.6 ± 2.3 years, and 5.9 ±3.3 years for the LA group. Results have been described according to the sections of the Health-Belief Model for the reasons aspect and then followed by the outcomes aspect. Relevant figures and tables follow each section.

4.1 Sociodemographic characteristics, Medical History, Medications and Symptoms

There were no statistically significant differences between the three study groups in age, gender, ethnicity, marital status, educational level, or the deprivation score (based on the New Zealand neighbourhood deprivation index) (Table 1). The average age in the HA group was younger than the average age for the LA and NR study groups, however this is not statistically significant (Table 1). There was also no statistically significant differences between the three study groups with respect to transportation to the CR programmes due to having a current drivers licence, having access to transportation to attend CR or the distance to travel to the nearest maintenance community-based CR programme. However all HA study group participants had a current drivers licence and access to transport to attend maintenance community-based CR, whereas some participants in the LA and NR study groups did not (Table 1).

Comparing medical history across the three study groups there were a statistically significant differences of a higher prevalence of family history of cardiovascular disease, angina and cardiac valve surgery in the HA study group compared to both the LA and NR study groups. The risk factors for CAD of hypertension and dyslipidaemia were the most

prevalent across the three study groups, though there were no statistically significant differences between the groups in any individual risk factor or in the total number of risk factors (Table 2). When comparing the totals of the CAD conditions across the three study groups having a myocardial infarction was the most common, followed by an angioplasty or a stent inserted (Table 2).

There were no differences in the types of cardiovascular medications that were prescribed to participants across the three study groups (Table 3). The most commonly prescribed cardiovascular related medications that were prescribed were aspirin and lipid lowering agents (Table 3). Dizziness, fainting and blackouts were the only statistically significant difference in CAD symptoms between the three study groups (Table 4). The HA group had a higher prevalence of dizziness, fainting and blackouts compared to both the LA and NR study groups (Table 4, Figure 2).

4.2 Perceived Threat

High scores for timeline, consequences and cyclical represents a strong beliefs about the number of symptoms, chronicity, cyclical nature and negative consequences of CAD [71]. Whereas high scores for personal and treatment control represent positive beliefs about controllability and understanding of CAD [71]. With perceived threat the perception of the chronicity of CAD was high, while perceived cyclic nature was low (Table 5) and perceived consequences scored mid-range, while perceived personal control was high (Table 5). However, there were no statistically significant differences between the three groups for any of the perceived threat variables (Table 5).

4.3 Cues to Action

Scores between 4 and 5 suggest the factor was encouraging, whereas scores between 1 and 2 suggest the factor was discouraging. Statistically significant differences were seen

between the three groups for triggers that affected participants' decision to attend maintenance community-based CR programmes (Table 6 and Figure 3). The HA group perceived more encouragement to attend from worry about health, not wanting another MI, CR programme newsletters and others having heart problems compared to the NR study group (Table 6, Figure 3). The HA group also perceived more encouragement from others having heart problems to attend maintenance community-based CR compared to the LA study group (Table 6, Figure 3). The LA group perceived more encouragement from family and worry about health to attend to the NR study group (Table 6, Figure 3). There were no statistically significant differences between the study groups for receiving encouragement to attend maintenance community-based CR from the doctor, friends, education about heart health, TV advertisements, or family history (Table 6).

4.3.1 Other Comments on Cues to Action

A total of 32 participants commented on cues to action to attending maintenance community-based CR programmes, of which there were 9 in the HA group (81.8%), 11 in LA (68.8%) and 12 in the NR group (70.6%). For the most part cues to action were encouraging factors to attend; however some were actively discouraged to attend maintenance community-based CR programmes (Table 7). These cues were then analysed into common themes within each of the three study groups. Themes that emerged from the HA group included the cardiology team, family, social, self-motivation, obligation and discouraging factors. Themes that emerged from the LA group included the cardiology team, family, self-motivation, financial, and health. And lastly themes that emerged from the NR group were the cardiology team, family, health professionals, education, and social aspects (Table 7). A visual diagram of the themes that emerged from cues to action shows how often that theme emerged by the font size compared to other words (Figure 4). This

visual diagram shows how the cardiology team was the most prominent theme to emerge from cues to action to attend maintenance community-based CR.

4.4 Perceived Benefits

Scores are between 1 and 5, higher scores represent that the participant perceived the benefit will be gained, compared to lower scores indicating that the benefit will not be gained. Many of the perceived benefits variables had statistically significant differences between the three study groups (Table 8, Figures 5,6,7). Statistically significant differences were seen between the HA and NR group in the variables of the ability to perform activities of daily living, social standing, improved body functioning, and sense of accomplishment in which the HA perceived a greater gain (Table 8, Figure 5). Statistically significant differences were seen between the LA and NR groups for the variables of ability to perform activities of daily living, improved body functioning, muscle strength, cardiovascular system functioning, and sense of accomplishment in which the LA group perceived a greater gain (Table 8, Figure 6). Statistically significant differences were observed between the HA and LA groups for the variables of social standing, and at ease with people in which the HA group perceived a greater gain (Table 8, Figure 7). There were no statistically significant differences between the groups in the perceived benefits of manage stress; strengthen bones; improved mood; aid in weight control; psychological state; companionship; mental alertness or acceptance by others (Table 8).

4.4.1 Other Comments on Perceived Benefits

For perceived benefits a total of 33 participants gave comments, 10 of whom were in the HA group (90.9%), 15 in the LA group (93.8%) and 8 in the NR group (47.1%). Following analysis using the general inductive approach benefits were arranged into common themes within each of the three study groups (Table 9). Themes that emerged

from the HA group included social aspects, variety of exercises, expertise, and physical benefits. Themes that emerged from the LA group included social aspects, physical benefits, enjoyment and expertise. And themes that emerged from the NR group included social aspects and reservation towards the effectiveness of maintenance community-based CR programmes (Table 9). A visual diagram of the themes that emerged from perceived benefits shows how often that theme emerged by the font size compared to other words (Figure 8). This visual diagram shows how social was the most prominent theme to emerge from perceived benefits to attend maintenance community-based CR (Figure 8).

4.5 Perceived Barriers

Scores are between 1 and 5, higher scores represent perceived barrier to attending maintenance community-based CR. The only statistically significant difference in perceived barriers was NR had a lower perceived need for maintenance community-based CR than HA and LA groups (Table 10, Figure 9). Values for mean total barriers, logistical factors, work and time conflicts, comorbidities were not statistically significant across the three study groups (Table 10, Figure 9).

4.5.1 Other Comments on Perceived Barriers

A total of 35 participants commented on perceived barriers to attending maintenance community-based CR programmes, 9 of whom were in the HA group (81.8%), 13 in the LA group (81.3%) and 13 in the NR group (76.5%). Following analysis using the general inductive approach barriers were arranged into common themes within each of the three study groups (Table 11). Themes that emerged from the HA group included other commitments, weather and physical barriers. Themes that emerged from the LA group included other commitments, format of programmes, weather, awareness, stigma and comorbidities. And lastly themes that emerged from the NR group were other

commitments, format of programmes, own exercise, comorbidities and awareness (Table 11). A visual diagram of the themes that emerged from perceived barriers shows how often that theme emerged by the font size compared to other words (Figure 10). This visual diagram shows how other commitments was the most prominent theme to emerge from perceived barriers to attend maintenance community-based CR (Figure 10).

Table 1. *Sociodemographic characteristics across study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Age (years)	72.7 ± 6.9	69.6 ± 5.1	74.1 ± 8.4	73.4 ± 6.2	0.216
Male gender [n(%)]	31 (70.5)	8 (72.7)	11 (68.8)	12 (70.6)	0.975
Ethnicity [n(%)]					
NZ European	39 (88.6)	10 (90.9)	13 (81.3)	16 (94.1)	0.679
Maori	1 (2.3)	0 (0)	1 (6.3)	0 (0)	
Other	4 (9.1)	1 (9.1)	2 (12.5)	1 (5.9)	
Marital status [n(%)]					
Married/living with partner	32 (72.7)	8 (72.7)	12 (75.0)	12 (70.6)	0.648
Education [n(%)]					
University degree	13 (29.5)	2 (18.5)	6 (37.5)	5 (29.4)	0.860
Transportation [n(%)]					
Current drivers licence	42 (95.5)	11 (100.0)	15 (93.8)	16 (94.1)	0.704
Transportation access	42 (95.5)	11 (100.0)	16 (100.0)	15 (88.2)	0.189
Distance to CR (km)	5.83 ± 4.47	5.69 ± 3.65	7.08 ± 4.87	4.75 ± 4.49	0.331
NZ Neighbourhood deprivation index (1-10)	4.95 ± 2.84	5.45 ± 2.66	4.81 ± 2.56	4.76 ± 3.29	0.803

HA = High-attenders; LA = Low-attenders; NR = Non-registered; CR = Cardiac Rehabilitation NZ = New Zealand

Continuous data are reported as mean ± SD

Categorical data are reported as n (%)

Table 2. *Medical history across study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Risk factors [n(%)]					
Family history of CAD	12 (27.3)	3 (27.3)	2 (12.5)‡	7 (41.2)*	0.040
Obesity (based on BMI ≥ 30.0 kg/m^2)	9 (20.9)	3 (27.3)	2 (13.3)	4 (23.5)	0.651
Past smoker (quit more than 6 months ago)	13 (29.5)	4 (36.4)	5 (31.3)	4 (23.5)	0.754
Hypertension	30 (68.2)	8 (72.7)	10 (62.5)	12 (70.6)	0.824
Dyslipidaemia	30 (68.2)	8 (72.7)	11 (68.8)	11 (64.7)	0.904
Diabetes	5 (11.4)	1 (9.1)	2 (12.5)	2 (11.8)	0.961
Total number of risk factors (n)	2.00 ± 1.02	2.18 ± 1.07	1.93 ± 1.03	1.94 ± 1.02	0.800
Comorbid conditions [n(%)]					
Cardiac valve surgery	5 (11.4)	4 (36.4)	0 (0) ‡	1 (5.9) *	0.009
Angina	17 (38.6)	8 (72.7)	5 (31.3) ‡	4 (23.5) *	0.025
Coronary artery bypass surgery	21 (47.7)	8 (72.7)	8 (50.0)	5 (29.4)	0.079
Anxiety	3 (6.8)	2 (18.2)	1 (6.3)	0 (0)	0.175
Depression	3 (6.8)	2 (18.2)	1 (6.3)	0 (0)	0.175
Asthma	5 (11.4)	2 (18.2)	0 (0)	3 (17.6)	0.199
Myocardial infarction	30 (68.2)	6 (54.5)	10 (62.5)	14 (82.4)	0.252
Musculoskeletal problems	29 (65.9)	6 (54.5)	12 (75.0)	11 (64.7)	0.270
Other CVD	3 (6.8)	1 (9.1)	2 (12.5)	0 (0)	0.342
Heart failure	1 (2.3)	0 (0)	1 (6.3)	0 (0)	0.408
Peripheral vascular disease	1 (2.3)	0 (0)	0 (0)	1 (5.9)	0.444
Stroke	1 (2.3)	0 (0)	0 (0)	1 (5.9)	0.444
Other disease	18 (40.9)	5 (45.5)	8 (50.0)	5 (29.4)	0.456
Transient ischemic attack	5 (11.4)	2 (18.2)	2 (12.5)	1 (5.9)	0.596
COPD	2 (4.5)	0 (0)	1 (6.3)	1 (5.9)	0.704
Coronary angioplasty/stent	26 (59.1)	6 (54.5)	9 (56.3)	11 (64.7)	0.831
Cancer	13 (29.5)	3 (27.3)	5 (31.3)	5 (29.4)	0.975

* $p < 0.05$ for HA versus NR

‡ $p < 0.05$ for HA versus LA

BMI = body mass index; CAD = coronary artery disease; CVD = cardiovascular disease; COPD = chronic obstructive pulmonary disorder

Continuous data are reported as mean ± SD

Categorical data are reported as n (%)

Table 3. *Medications across study groups.*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Medications [n(%)]					
Calcium channel blocker	10 (22.7)	4 (36.4)	1 (6.3)	5 (29.4)	0.131
Aspirin	39 (88.6)	8 (72.7)	15 (93.8)	16 (94.1)	0.158
Nitrate	4 (9.1)	2 (18.2)	0 (0)	2 (11.8)	0.241
GTN spray	4 (9.1)	0 (0)	1 (6.3)	3 (17.6)	0.251
Beta blocker	28 (63.6)	8 (72.7)	8 (50.0)	12 (70.6)	0.362
Other medications	40 (90.9)	9 (81.8)	15 (93.8)	16 (94.1)	0.480
ACE inhibitor	22 (50.0)	5 (45.5)	7 (43.8)	10 (58.8)	0.647
Diuretic	6 (13.6)	1 (9.1)	3 (18.8)	2 (11.8)	0.741
Lipid lowering agent	38 (86.4)	9 (81.8)	14 (87.5)	15 (88.2)	0.878

ACE = Angiotensin-converting enzyme;
GTN = Gyceryl trinitrate
Categorical data are reported as n (%)

Table 4. *Symptoms of coronary artery disease across study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Symptoms [n(%)]					
Dizziness, fainting or blackouts	8 (18.2)	5 (45.5)	3 (18.8) ‡	0 (0) *	0.010
Musculoskeletal problems	10 (22.7)	4 (36.4)	5 (31.3)	1 (5.9)	0.102
Lower leg cramps with short walks	5 (11.4)	2 (18.2)	3 (18.8)	0 (0)	0.169
Shortness of breath with mild exertion	13 (29.5)	2 (18.2)	7 (43.8)	4 (23.5)	0.282
Chest discomfort with exertion	14 (31.8)	3 (27.3)	6 (37.5)	5 (29.4)	0.824

* $p < 0.05$ for HA versus NR
‡ $p < 0.05$ for HA versus LA
Categorical data are reported as n (%)

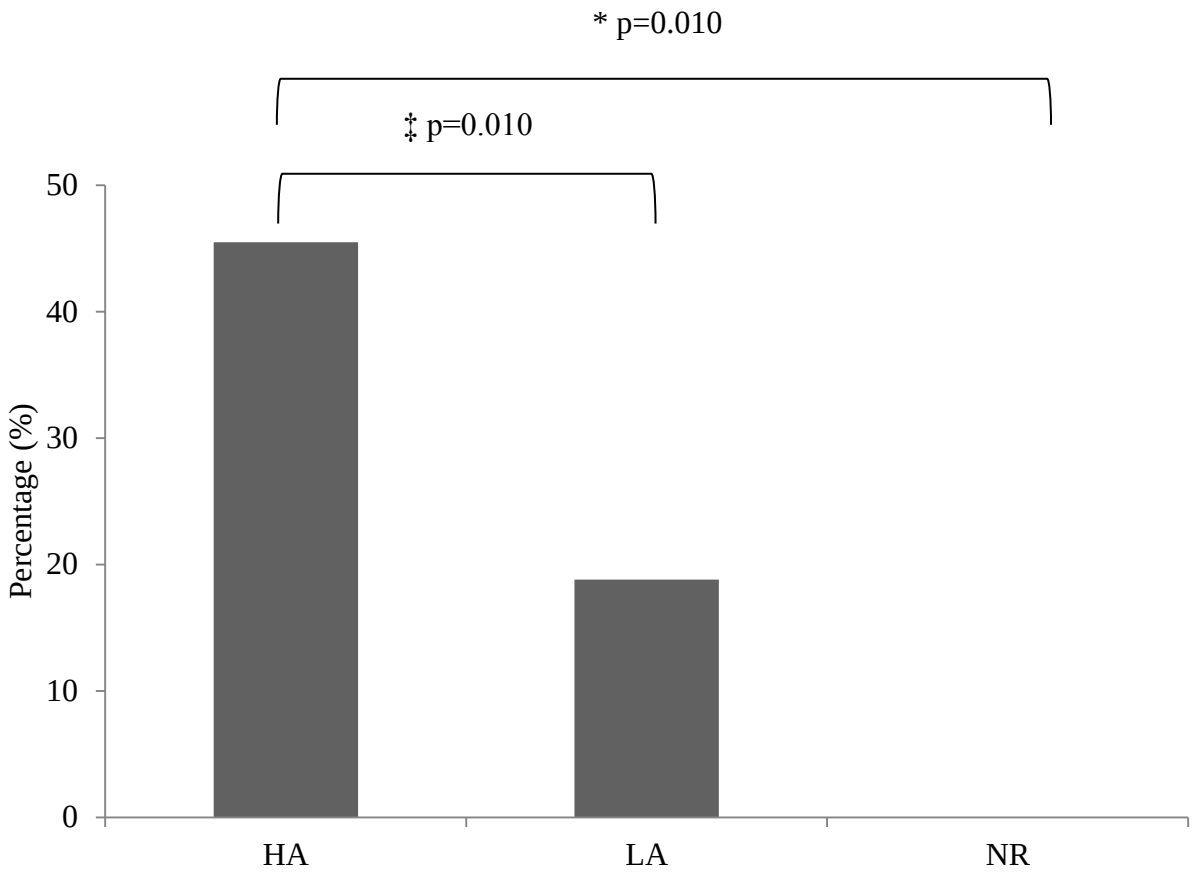

Figure 2. Percentage of participants who have the coronary artery disease symptom of dizziness, fainting and blackouts across the three study groups

*p < 0.05 for HA versus NR

‡p < 0.05 for HA versus LA

Table 5. *Perceived threat of coronary artery disease across the study groups (IPQ-R results)*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Perceived threat (mean ± SD)					
Timeline cyclical	8.5 ± 3.9	10.4 ± 5.1	7.8 ± 3.9	7.9 ± 2.7	0.179
Consequences	14.3 ± 4.8	15.7 ± 3.2	14.3 ± 5.8	13.4 ± 4.6	0.451
Timeline (acute/chronic)	22.8 ± 5.0	22.5 ± 7.0	22.1 ± 4.4	23.6 ± 4.2	0.693
Personal control	24.9 ± 4.1	24.3 ± 4.9	25.0 ± 4.5	25.1 ± 3.2	0.861
Treatment control	18.2 ± 3.8	18.1 ± 3.5	17.9 ± 3.7	18.4 ± 3.7	0.931

Continuous data are reported as mean ± SD

Table 6. *Cues to action to attending maintenance community-based CR across the study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Cues to action (mean ± SD)					
Worry about health	3.50 ± 0.82	3.82 ± 0.98	3.75 ± 0.93	3.06 ± 0.24 *†	0.014
Do not want another heart attack	3.57 ± 0.85	4.09 ± 0.94	3.63 ± 0.89	3.18 ± 0.53 *	0.015
Others having heart problems	3.32 ± 0.71	3.82 ± 0.98	3.19 ± 0.54 ‡	3.12 ± 0.49 *	0.021
Newsletters	3.41 ± 0.87	4.00 ± 1.00	3.31 ± 1.01	3.12 ± 0.33 *	0.024
Family	3.80 ± 0.85	3.91 ± 0.94	4.13 ± 0.81	3.41 ± 0.71 †	0.045
Symptoms of CAD	3.39 ± 0.78	3.73 ± 1.00	3.50 ± 0.89	3.06 ± 0.24	0.064
Friends	3.59 ± 0.95	3.82 ± 0.87	3.88 ± 1.20	3.18 ± 0.53	0.067
Family History	3.25 ± 0.78	3.09 ± 1.22	3.50 ± 0.73	3.12 ± 0.33	0.281
Doctor	3.52 ± 0.93	3.73 ± 0.91	3.56 ± 1.03	3.35 ± 0.86	0.578
TV advertisements	3.16 ± 0.81	3.00 ± 1.34	3.25 ± 0.58	3.18 ± 0.53	0.735
Education about heart health	4.16 ± 1.58	4.18 ± 1.60	4.00 ± 1.71	4.29 ± 1.53	0.872

CAD = coronary artery disease; TV = television; CR = Cardiac Rehabilitation

* $p < 0.05$ for HA versus NR

‡ $p < 0.05$ for HA versus LA

† $p < 0.05$ for LA versus NR

Continuous data are reported as mean ± SD

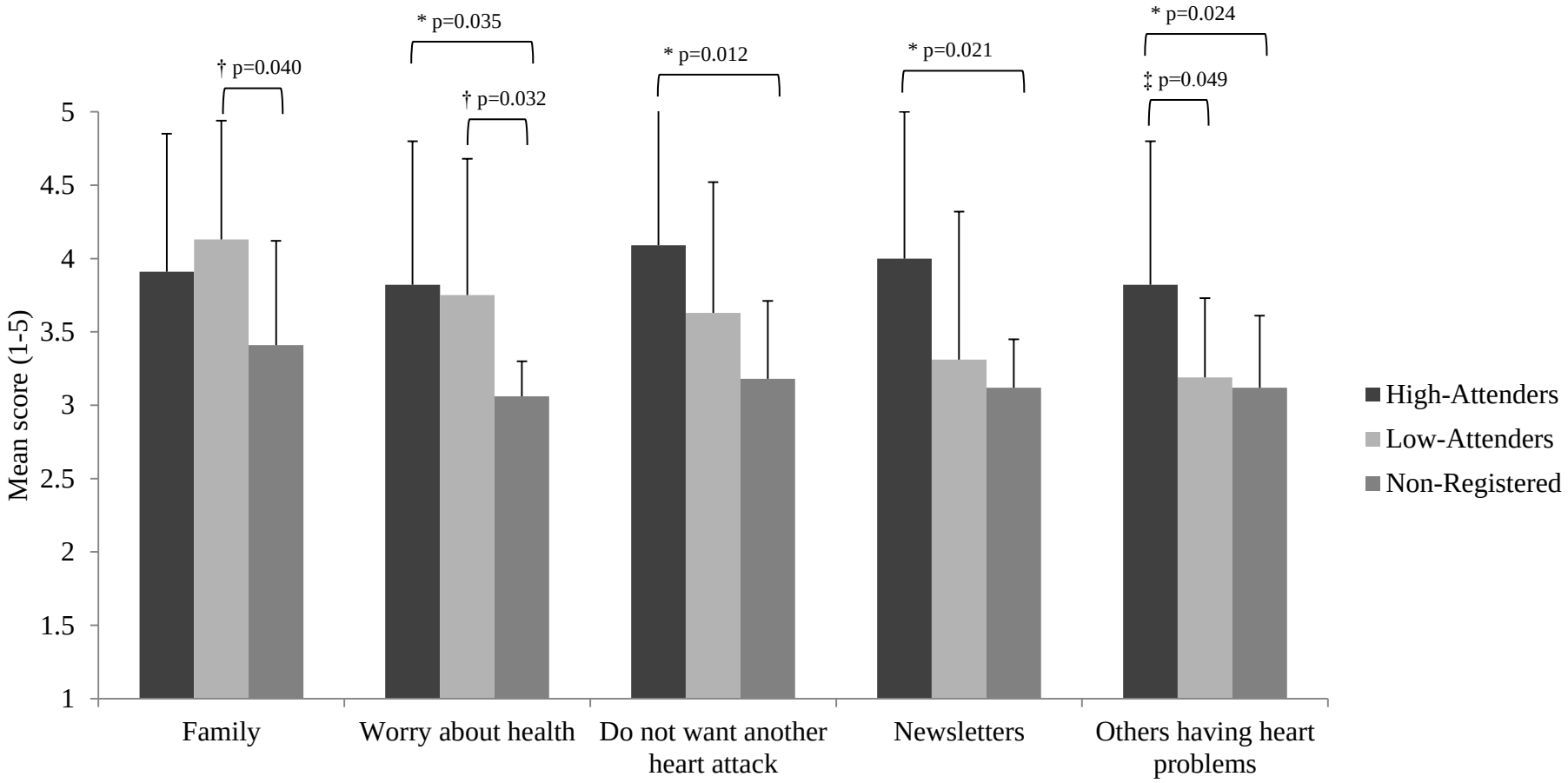

Figure 3. Mean score for items from the cues to action questionnaire, across the three study groups

*p < 0.05 for HA versus NR

‡p < 0.05 for HA versus LA

†p < 0.05 for LA versus NR

Table 7. *Comments on cues to action to attending maintenance community-based CR across study groups*

High-Attenders [n=9 (81.8%)]	**Low-Attenders [n=11 (68.8%)]**	**Non-Registered [n=12 (70.6%)]**
Cardiology team [n=4 (44.4%)] "The cardio nurse from the hospital was the first to recommend it…The people at the cardiac department were brilliant from start to finish"; "The cardiac group at the hospital"; "Mainly at the hospital when the doctors let me know what had happened and encouraged me to go to the gym"; "A member from the Phoenix programme came and visited me in hospital with the physiotherapist to tell me I should join the programme"	**Cardiology team [n=4 (36.4%)]** "*Cardiac nurse* as she ran phase II. *The physiotherapist* helped encourage by doing the courses"; "the time and effort of the surgeons give me the most encouragement"; "In the phase II sessions the gym sessions led up to the final test and this led to a natural progression to attend phase III"; "*the cardiac nurse* and *physiotherapist* encouraged me the most to go"	**Cardiology team [n=3 (25.0%)]** "*The physiotherapist* was the most encouraging"; "The liaison officer at the hospital encouraged me to go. *The Physiotherapist* was very good at taking exercises and I got a very good workout"; "When I was in the ward and saw the ad and thought that could be a good thing"
Family [n=3 (33.3%)] "My wife wanted to play table tennis and that was the main reason I ended up going"; "My wife is the greatest support as we both support each other to keep healthy"; "My son, who is also a GP, supports me 100% to go"	**Family [n=3 (27.3%)]** "My husband goes too"; "*Jennifer* goes and it means I get to see her there"; "Seeing Dad pretty active at 90 encourages me"	**Family [n=3 (25.0%)]** "Went originally to support the wife"; "My brother has told me about it, but not encouraged me to go"; "because of my circumstances with… my wife's health it wasn't going to work out"
Self-motivation [n=1 (11.1%)] "I have always done fitness things, so it just felt like I was carrying on"	**Self-motivation [n=3 (27.3%)]** "Just myself. My own motivation"; "It's mostly my self-motivation to attend"; "It has become a habit now that I just come along"	
Financial [n=2 (22.2%)] "Cost is a factor, its $3.50 to go to the pool and that can make it quite expensive"	**Financial [n=2 (18.2%)]** "It is organised for me and inexpensive"; "The financial cost of the operation…gives me the most encouragement."	

Social [n=3 (33.3%)] "The general company and enjoying myself encourages me to attend"; "The main reason for going is meeting the people there"; "Other members all encourage each other and look out for those who haven't been for a while, contact them to make sure they are OK"		**Social [n=1 (8.3%)]** "The biggest factor for me wanting to join was I wanted to integrate into the community and find out more about the people and the surrounding area"
Obligation [n=1 (11.1%)] "The fact that I am the sectary I have to go"		
	Health [n=1 (9.1%)] "My weight encouraged me to go along, and the Lupus"	
		Health professionals [n=2 (16.7%)] "The Doctor was the only one to talk to me about it. He told me all about it but when he heard what exercises I was already doing on my own he allowed me to make my own choice on how to manage my heart"; "It was the physiotherapist who recommended I didn't go if it was painful"
		Education [n=1 (8.3%)] "I first heard about the Phoenix programme from the heart foundation where someone came and talked about it. It was there that I was encouraged to go"; "Education about heart health encouraged me to do the right thing for my heart and myself"; "I heard about

		the Phoenix programme at the seminars at the national heart foundation and I had decided then and there that I didn't want to be involved"

Figure 4. Visual diagram of the frequency of the themes emerging across study groups on cues to action to attending maintenance community-based CR

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Table 8. *Perceived benefits from attending maintenance community-based CR across the study groups (MOEES results)*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Perceived benefits (mean ± SD)					
Sense of accomplishment	4.27 ± 0.79	4.64 ± 0.51	4.50 ± 0.52	3.82 ± 0.23 *†	0.007
Muscle strength	4.36 ± 0.75	4.55 ± 0.52	4.69 ± 0.48	3.94 ± 0.89 †	0.008
Ability to perform activities of daily living	4.30 ± 0.95	4.64 ± 0.51	4.63 ± 0.50	3.76 ± 1.25 *†	0.010
Body functioning	4.41 ± 0.79	4.73 ± 0.47	4.63 ± 0.50	4.00 ± 1.00 *†	0.019
Cardiovascular system functioning	4.41 ± 0.69	4.55 ± 0.52	4.69 ± 0.48	4.06 ± 0.83 †	0.021
Social standing	3.48 ± 1.13	4.27 ± 0.79	3.19 ± 1.22 ‡	3.24 ± 1.03 *	0.022
At ease with people	3.64 ± 0.97	4.27 ± 0.65	3.38 ± 1.03 ‡	3.47 ± 0.94	0.036
Aid in weight control	3.93 ± 0.95	4.36 ± 0.51	4.06 ± 0.93	3.53 ± 1.07	0.056
Mental alertness	4.07 ± 0.87	4.45 ± 0.52	4.19 ± 0.83	3.71 ± 0.99	0.065
Psychological state	3.93 ± 0.87	4.27 ± 0.47	4.06 ± 0.77	3.59 ± 1.06	0.095
Acceptance by others	3.61 ± 0.92	4.00 ± 0.63	3.69 ± 1.01	3.29 ± 0.92	0.129
Companionship	3.89 ± 0.97	4.36 ± 0.67	3.81 ± 0.98	3.65 ± 1.06	0.151
Improved mood	4.05 ± 1.08	4.55 ± 0.52	4.00 ± 1.21	3.76 ± 1.15	0.171
Manage stress	3.91 ± 0.98	4.18 ± 0.75	4.06 ± 0.93	3.59 ± 1.12	0.222
Strengthen bones	4.00 ± 0.86	4.27 ± 0.79	4.06 ± 0.85	3.76 ± 0.90	0.301

* $p < 0.05$ for HA versus NR

‡ $p < 0.05$ for HA versus LA

† $p < 0.05$ for LA versus NR

Continuous data are reported as mean ± SD

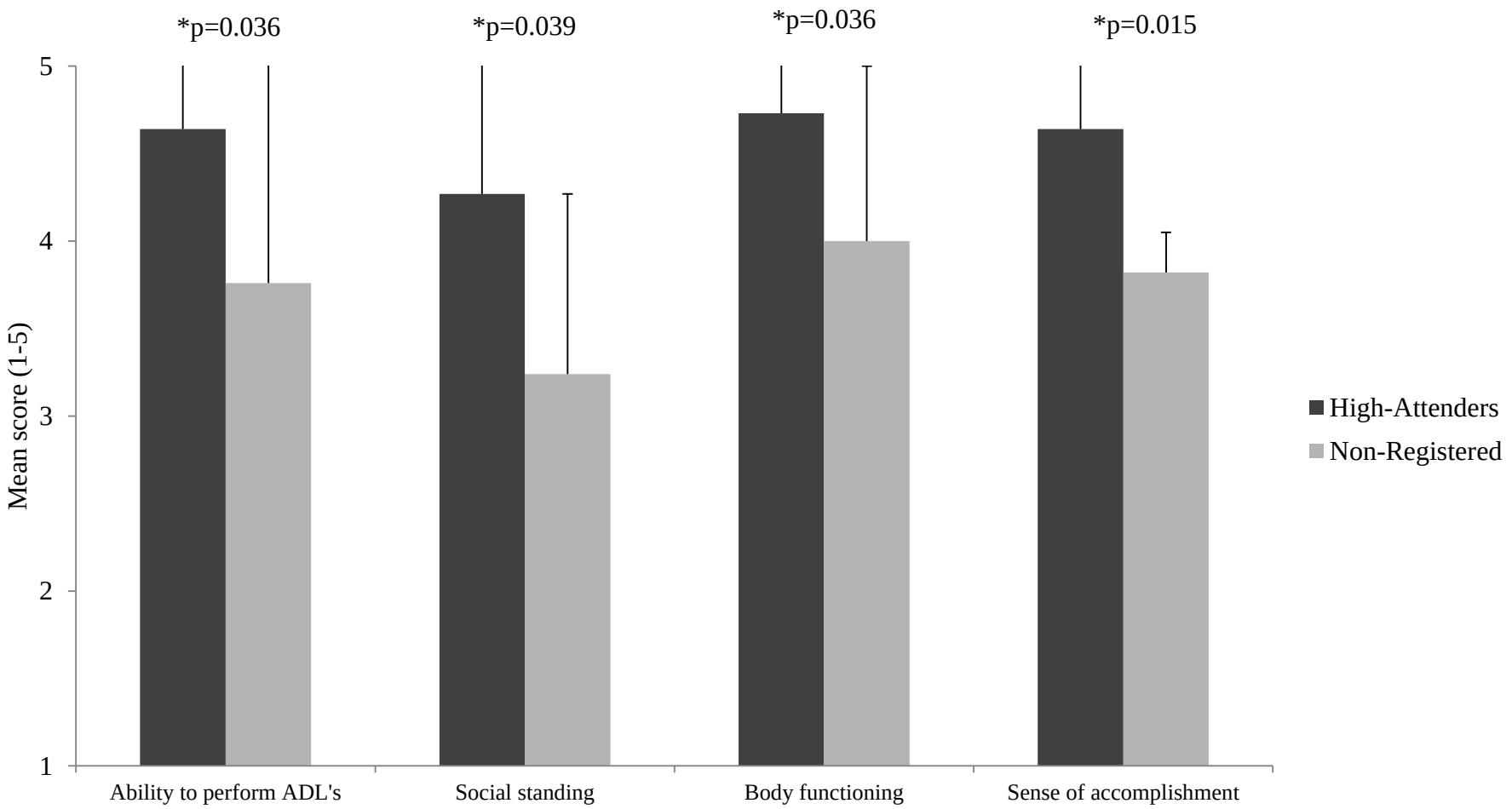

Figure 5. Mean score for perceived benefits from attending maintenance community-based CR programmes between HA and NR study groups
*p < 0.05 for HA versus NR

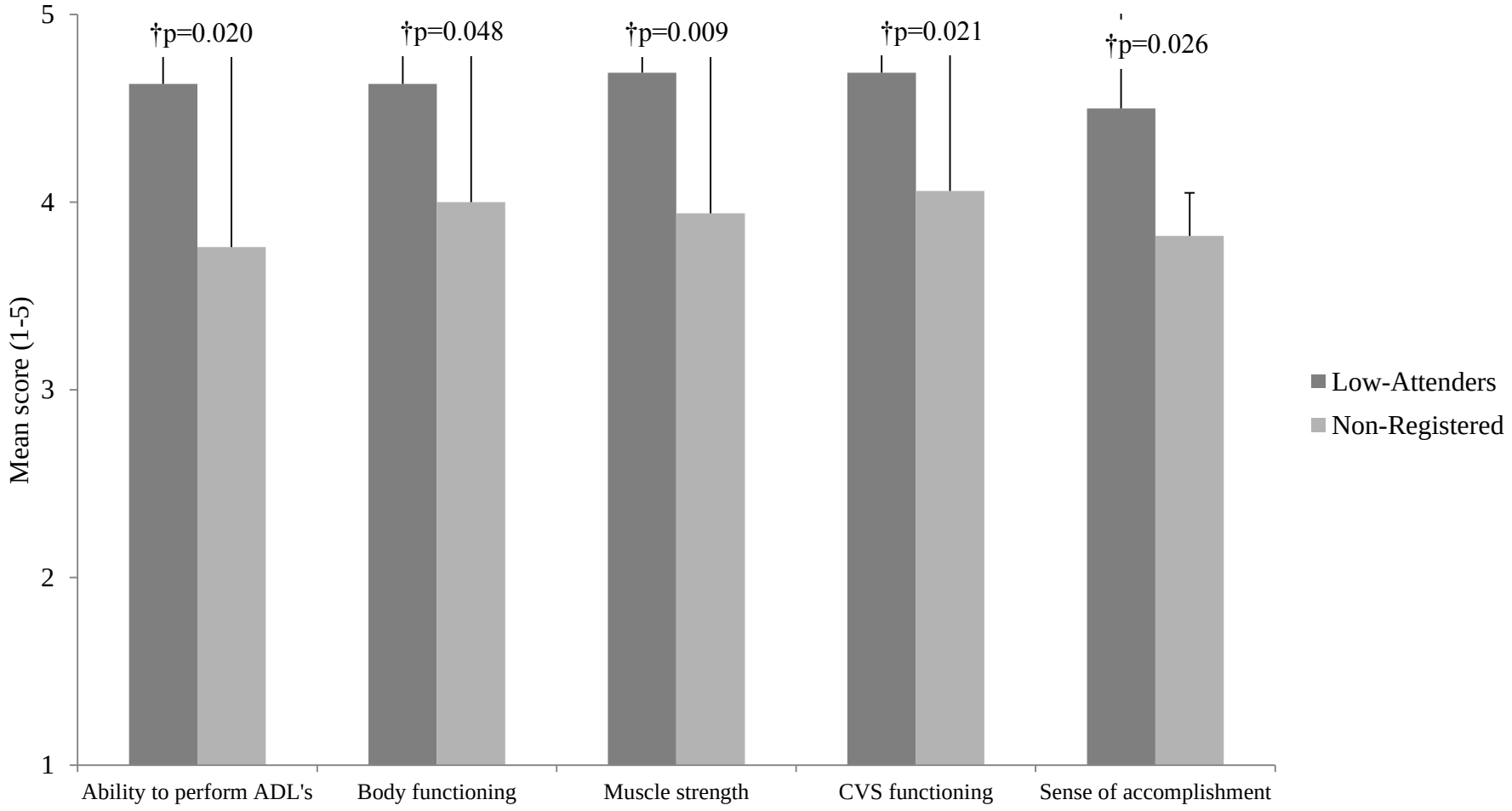

Figure 6. Mean score for perceived benefits from attending maintenance community-based CR programmes between LA and NR study groups
†p < 0.05 for LA versus NR

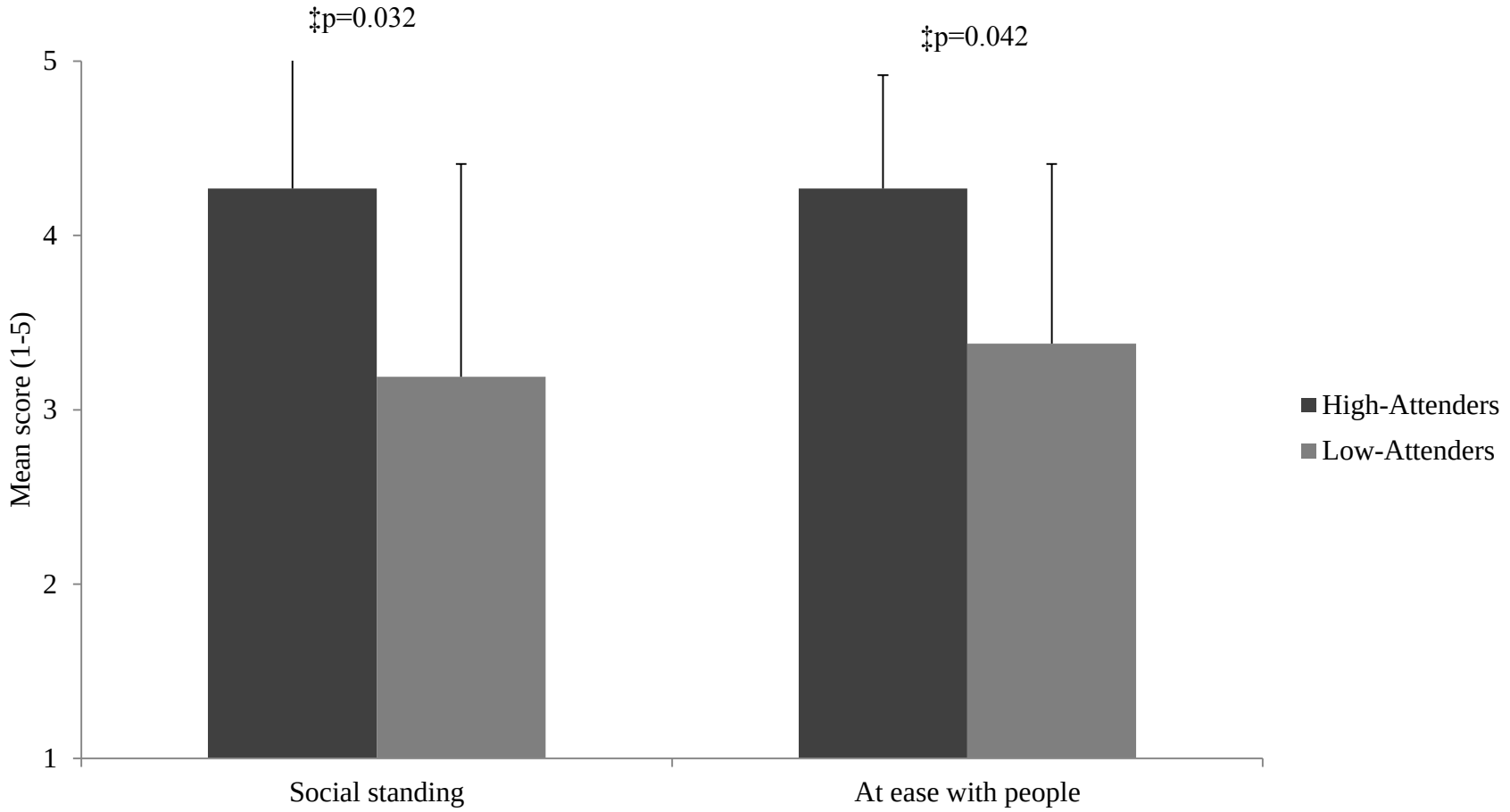

Figure 7. Mean score for perceived benefits from attending maintenance community-based CR programmes between HA and LA study groups
‡p < 0.05 for HA versus LA

Table 9. *Comments on perceived benefits from attending maintenance community-based CR across study groups*

High-Attenders [n=10 (90.1%)]	**Low-Attenders [n=15 (93.8%)]**	**Non-Registered [n=8 (47.1%)]**
Social [n=4 [40.0%]] "Have a chat"; "there are others to ask for advice"; "The company is great… Everyone has the same problem… something to do at night"; "Gives you a chance to meet others"; "You get to meet people, all roughly the same age, and lots have the same problems and going through the same things as you"	**Social [n=5 [33.3%]]** "It's a good place to share ideas"; "it's an outing"; "helps get me out and about"; "get to have a few laughs"; "We have a laugh"	**Social [n=4 [50.0%]]** "It is a great way to meet others"; "they greet you at the door and make you feel welcome, check up on you if you miss a session"; "my brother…he has gotten good social contacts out of it"; "there is some social/communication benefits"
Physical [n=2 (20.0%)] "Increasing life expectancy", feeling "better after having done the exercises", it also helps with other co-morbidities and how over all "people that go to the programme are fitter than the people that you see walking in the streets"; "working in the garden isn't the same as the exercises"	**Physical [n=5 (33.3%)]** "I don't breathe as heavy anymore"; "flexibility and balance have improved"; "before I wouldn't go because of the pain, but now the exercise has made my shoulder better"; "never been better"; "helps my physical well-being for the rest of the day".	
Expertise [n=4 (40.0%)] "There is a sense of security having the physiotherapists rather than personal trainers, as the physiotherapists have knowledge of the conditions and exercises"; "the fitness instructor is really great … she lets you know what muscles you are working"; "it's a controlled environment which is safe and there are others to ask for advice"; "everyone has the same problem".	**Expertise [n=3 (20.0%)]** "Security knowing what they can do and it gives them confidence to do things"; "updated on latest heart health"; "share ideas"	

Variety [n=6 (60.0%)] "The exercises work different muscles in different ways"; "table tennis helps with concentration"; "table tennis has a high-intensity and then rest component"; "change up the routine and make it interesting"; "knowledge on exercises and the conditions"; "the pool is non-weight bearing"		
	Enjoyment [n=4 (26.7%)] "I really enjoy it"; "we have a laugh…I enjoy moving to the music, it is fun"; "enjoy meeting there"; "I quite like it, they are a friendly bunch of people"	
		Self-efficacy [n=3 (37.5%)] "The biggest benefit is proving you can exercise"; "it gives you a sense of assurance…so you can move on with your life"; "it does people good to go along and do the exercises"
		Reservations [n=2 (25.0%)] "Must have gotten benefits but it was more pain than gain [talking about out-patient exercises]"; "people would get the benefit depending on what they put in"

Figure 8. *Visual diagram of the frequency of the themes emerging across study groups on perceived benefits to attending maintenance community-based CR*

Table 10. *Perceived barriers to attending maintenance community-based CR across the study groups (CRBS results)*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Perceived barriers (mean ± SD)					
Perceived need for maintenance community-based CR	1.89 ± 0.89	1.72 ± 1.23	1.38 ± 0.39	2.48 ± 0.63 *†	0.001
Mean total barriers	1.92 ± 0.72	1.86 ± 1.03	1.64 ± 0.45	2.22 ± 0.61	0.066
Comorbidities	1.94 ± 0.82	2.21 ± 0.79	1.67 ± 0.79	2.04 ± 0.84	0.203
Work/time conflicts	2.37 ± 1.06	2.12 ± 0.92	2.69 ± 1.11	2.24 ± 1.08	0.321
Logistical factors	1.72 ± 0.85	1.77 ± 1.08	1.50 ± 0.57	1.89 ± 0.91	0.416

* $p < 0.05$ for HA versus NR

‡ $p < 0.05$ for HA versus LA

† $p < 0.05$ for LA versus NR

Continuous data are reported as mean ± SD

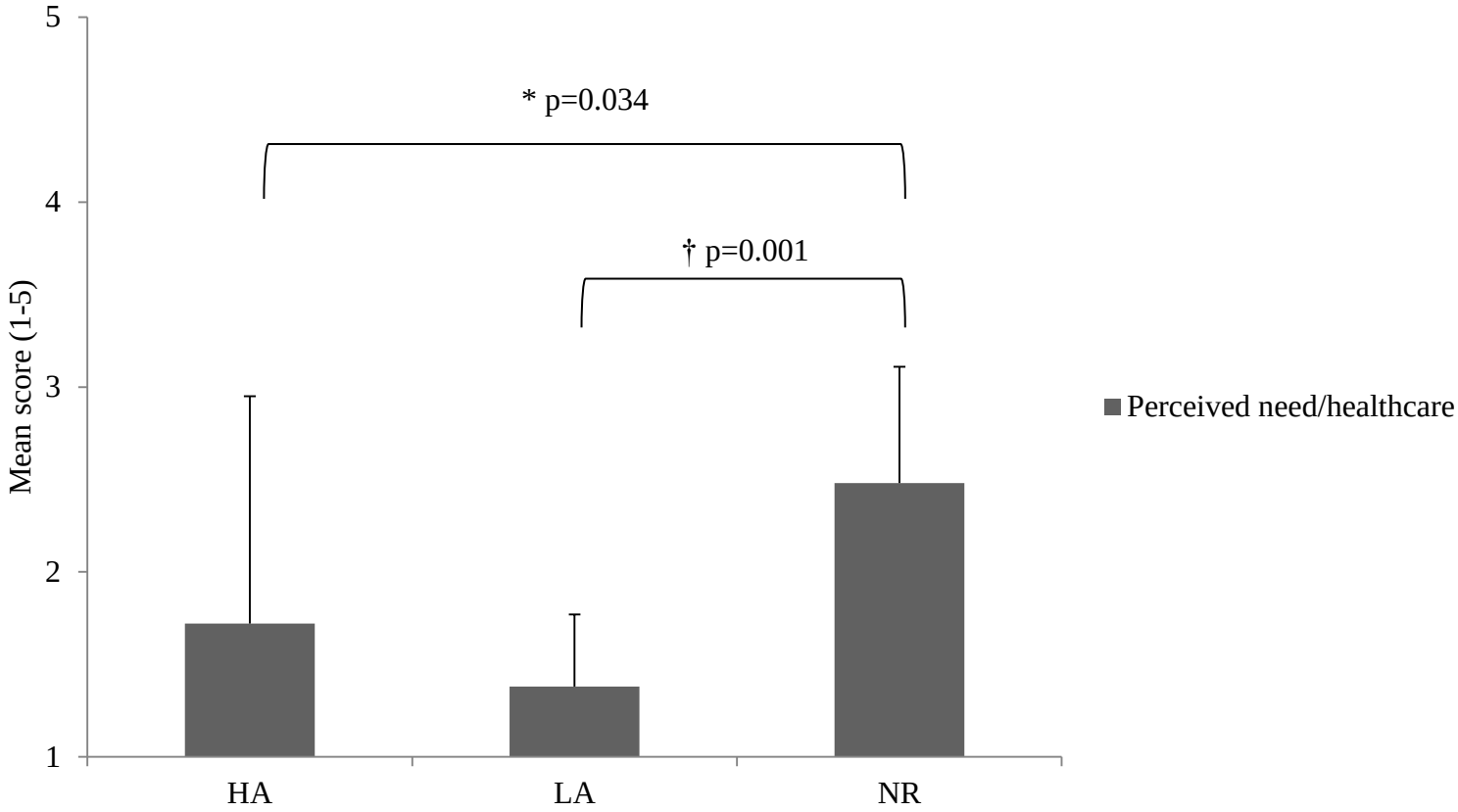

Figure 9. Perceived need for maintenance community-based CR
*p < 0.05 for HA versus NR
†p < 0.05 LA versus NR

Table 11. *Comments on perceived barriers to attending maintenance community-based CR across study groups*

High-Attenders [n=9 (81.8%)]	**Low-Attenders [n=13 (81.3%)]**	**Non-Registered [n=13 (76.5%)]**
Other commitments [n=5 (55.6%)] "If there is an odd trip or a holiday"; "grandchildren's birthdays"; "meetings on – vegetable growers"; "visitors are around"; "when my wife doesn't go, I don't go"	**Other commitments [n=6 (46.2%)]** "Other organisations like the church"; "mostly because of work"; "I am often away working"; "if visitors are around or family matters"; "holiday home"; "sometimes it runs over time so there isn't time to go"	**Other commitments [n=4 (30.7%)]** "There was another function on at the same time"; "I am travelling for work"; "have lots of other commitments and activities in the community. Have to look after my wife"; "I am too busy"
Weather [n=1 (11.1%)] "If it is snowing then I can't come in"	**Weather [n=2 (13.4%)]** "Extreme weather – snowed in icy conditions"; "I wonder what effect the harsh weather will have on attending the night sessions"	
	Format [n=5 (38.5%)] "The class time of Taieri is inconvenient as I have chronic fatigue"; "often away working especially on Thursdays and so often miss those sessions"; "can't go Thursdays as I don't have enough time"; "I sometimes wonder about health/hygiene of the swimming pool"; "Sometimes you don't get to exercise as there are so many other people"	**Format [n=5 (38.5%)]** "I didn't like getting into the whole group situation … They were aggressively fit"; "the exercise classes got too crowded"; "there are too many people there"; "the exercises were not hard enough for me so I don't go along"; "I like exercising on my own as I can chose when to go out and I can avoid the bad weather"
	Awareness [n=1 (7.7%)] "Nobody really told me about it, I found out about it through an article in the newspaper"	**Awareness [n=2 (15.4%)]** "I didn't actually know about the Phoenix programme until I read your information, otherwise I might have gone, or at least considered it"; "Nobody told me about the Phoenix programme apart from my brother"

	Comorbidities [n=1 (7.7%)] "Once or twice when feeling low, mental side won out over the physical"	**Comorbidities [n=2 (15.4%)]** "I have my leg problem"; "Mostly I didn't go because of my shoulder hurting…also because of the COPD and asthma I couldn't breathe and I couldn't keep up"
Physical [n=2 (22.2%)] "If I were to break a leg"; "if I don't have the energy as I have been busy working on the farm"		
	Stigma [n=1 (7.7%)] "At first I didn't want to go as I didn't want to be a part of a heart programme"	
		Own exercise routine [n=7 (53.8%)] "I do lots of exercise already at home"; "I already go to a gym and am active"; "I do enough during the day usually and so I don't feel the need to go"; "the activities I do provide enough exercise"; "I like exercising on my own…I already had bikes and we got an exer-cycle so that I can exercise all the time"; "I am already active"; "exercise has always been part of my life. It made sense to just carry on. You can do your own exercises"

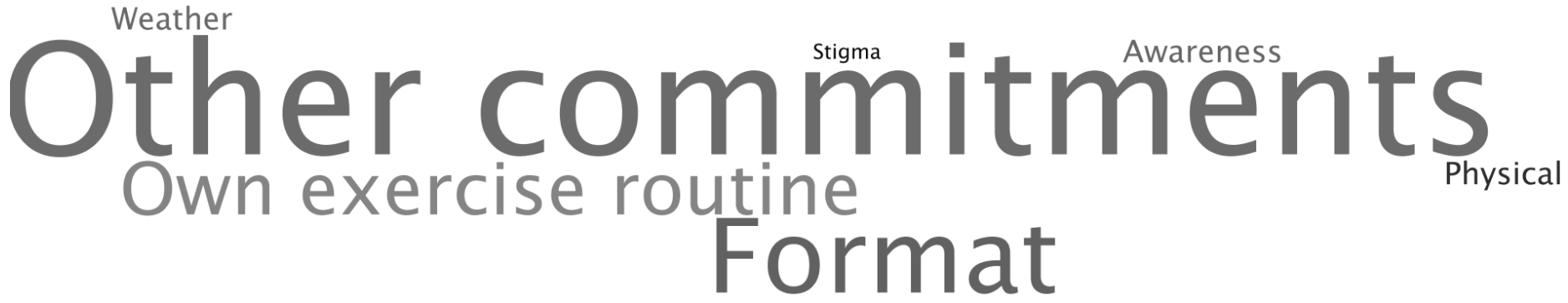

Figure 10. Visual diagram of the frequency of the themes emerging across study groups on perceived barriers to attending maintenance community-basedCR

4.6 Outcomes of Attending

Anthropometric and Resting Haemodynamic Values

Examining anthropometric between the three study groups found no differences in weight, body mass index (including total value and categorical variables), waist circumference (including total value and gender appropriate cut-offs of male ≥ 94cm and female ≥ 80cm) or waist to hip ratio (Table 12). No differences were seen between the three study groups for resting haemodynamic variables of heart rate, and systolic and diastolic blood pressure values (Table 12).

Physical Functioning

There were no statistically significant differences seen in any of the physical functioning tests (Table 13). This included the short physical performance battery which involve gait speed, chair to stand and balance tests score from 1 to 12 (Table 13). Other tests used included the 30 second chair to stand test, hand-grip and the six-minute walking test, all of which saw no statistically significant differences between the three study groups (Table 13).

Physical Activity Level

Physical activity was measured three ways, energy expenditure (target level ≥ 1000 kCal/week), time spent in moderate to vigorous physical activity (target ≥5 days/week active for ≥ 30minutes) and steps per day (target ≥10,000 steps per day). There was a statistically significant difference in energy expenditure (kCal/week) in which the HA group had a greater energy expenditure than both the LA and NR study groups (Table 14, Figure 11), all groups appear to be at target. There were no statistically significant differences in time spent in moderate to vigorous intensity physical activity over a 7-day

period, however HA group had more participants at target. There were also no statistically significant differences in steps per day, where no groups were at target, or meeting minimum physical activity guidelines for minutes (≥30 minutes per day) or steps (≥10,000 steps per day) guidelines on 5 or more days (Table 14).

Quality of Life

No statistically significant differences in quality of life subscales of physical function, role limitations (physical and emotional), body pain, general health, vitality, social function and mental health by group were observed (Table 15). However, it can be noted there was a trend in the social function subscale between the three study groups in which the NR group scored the highest (Table 15).

Table 12. *Anthropometric and resting haemodynamic values across groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Anthropometry (mean ± SD)					
Weight (kg)	78.1 ± 12.8	81.4 ± 15.5	77.8 ± 11.3	76.3 ± 12.5	0.592
BMI (kg/m^2)	26.9 ± 5.4	28.3 ± 5.3	25.8 ± 6.9	27.2 ± 3.6	0.476
BMI categories [n(%)]					
Normal - BMI 18.0 - 24.9 kg/m^2	11 (25.6)	3 (27.3)	3 (20.0)	5 (29.4)	0.786
Overweight - BMI 25.0-29.9 kg/m^2	23 (53.5)	5 (45.5)	10 (66.7)	8 (47.1)	
Obese - BMI ≥30 kg/m^2	9 (20.9)	3 (27.3)	2 (13.3)	4 (23.5)	
Waist circumference (cm)	98.3 ± 10.1	99.1 ± 11.9	100.6 ± 8.9	95.6 ± 9.9	0.363
Over gender recommended [n(%)]	37 (84.1)	8 (72.7)	15 (93.8)	14 (82.4)	0.330
Waist to hip ratio	0.92 ± 0.06	0.93 ± 0.07	0.94 ± 0.06	0.90 ± 0.06	0.219
Resting haemodynamics (mean ± SD)					
Heart rate (bpm)	64.1 ± 9.6	65.1 ± 12.6	64.3 ± 10.9	63.4 ± 5.8	0.898
Systolic blood pressure (mmHg)	134.8 ± 13.9	138.4 ± 13.2	133.4 ± 14.7	133.8 ± 14.1	0.621
Diastolic blood pressure (mmHg)	73.1 ± 9.3	76.1 ± 11.2	74.9 ± 7.1	69.6 ± 9.2	0.126

Above gender specific guidelines for normal waist circumference = Male ≥ 94 cm; Female ≥ 80 cm

Continuous data are reported as mean ± SD

Categorical data are reported as n (%)

Table 13. *Physical functioning test results across study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Physical functioning (mean ± SD)					
SPPB Total Score (1-12)	11.39 ± 0.97	11.64 ± 0.51	11.13 ± 1.26	11.47 ± 0.87	0.373
30 second chair to stands (n)	18.59 ± 6.42	20.45 ± 5.97	17.56 ± 6.98	18.35 ± 6.27	0.517
Hand-Grip (force.kg)					
Dominant hand	35.47 ± 9.9	36.91 ± 8.90	34.59 ± 11.22	35.35 ± 9.62	0.841
Non-dominant hand	31.52 ± 11.41	34.82 ± 10.47	29.50 ± 13.99	31.29 ± 9.29	0.501
Index	33.91 ± 9.9	35.86 ± 9.52	33.34 ± 11.32	33.32 ± 9.19	0.773
6 minute walk test distance (m)	597.3 ± 92.5	587.3 ± 76.4	577.4 ± 89.5	622.5 ± 103.4	0.353

SPPB = Short Physical Performance Battery
Continuous data are reported as mean ± SD

Table 14. *Physical activity level across study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
MVPA (min/day)	31.16 ± 21.63	42.91 ± 21.79	27.69 ± 21.58	26.82 ± 19.94	0.113
MVPA days active (≥30mins MVPA)	4.02 ± 2.37	4.09 ± 2.34	2.69 ± 2.33	2.65 ± 2.34	0.228
Inactive (<5 days)	30 (68.2)	5 (45.5)	13 (81.3)	12 (70.6)	0.141
Active (≥5 days)	14 (31.8)	6 (54.5)	3 (18.8)	5 (29.4)	
Total energy expenditure (kcal/week)	2861.2 ± 1300.9	3819.4 ± 1171.8	2434.2 ± 1057.8 ‡	2643.1 ± 1333.1 *	0.013
Inactive (>1000 kCal/week)	1 (2.3)	0 (0)	0 (0)	1 (5.9)	0.115
Active (1000 - 1999 kCal/week)	12 (27.3)	0 (0)	6 (37.5)	6 (35.3)	
Very active (≥2000 kCal/week)	31 (70.5)	11 (100.0)	10 (62.5)	10 (58.8)	
Steps (steps/day)	6090.6 ± 2345.7	7326.1 ± 2224.3	5666.1 ± 2486.5	5690.8 ± 2121.3	0.130
Steps - days active (≥10,000 steps)	0.91 ± 1.09	1.18 ± 1.25	0.94 ± 1.24	0.71 ± 0.85	0.539
Inactive (<5 days)	44 (100.0)	11 (100.0)	16 (100.0)	17 (100.0)	0.999
Active (≥5 days)	0 (0)	0 (0)	0 (0)	0 (0)	

* $p < 0.05$ for HA versus NR

‡ $p < 0.05$ for HA versus LA

MVPA = moderate to vigorous physical activity

Continuous data are reported as mean ± SD

Categorical data are reported as n (%)

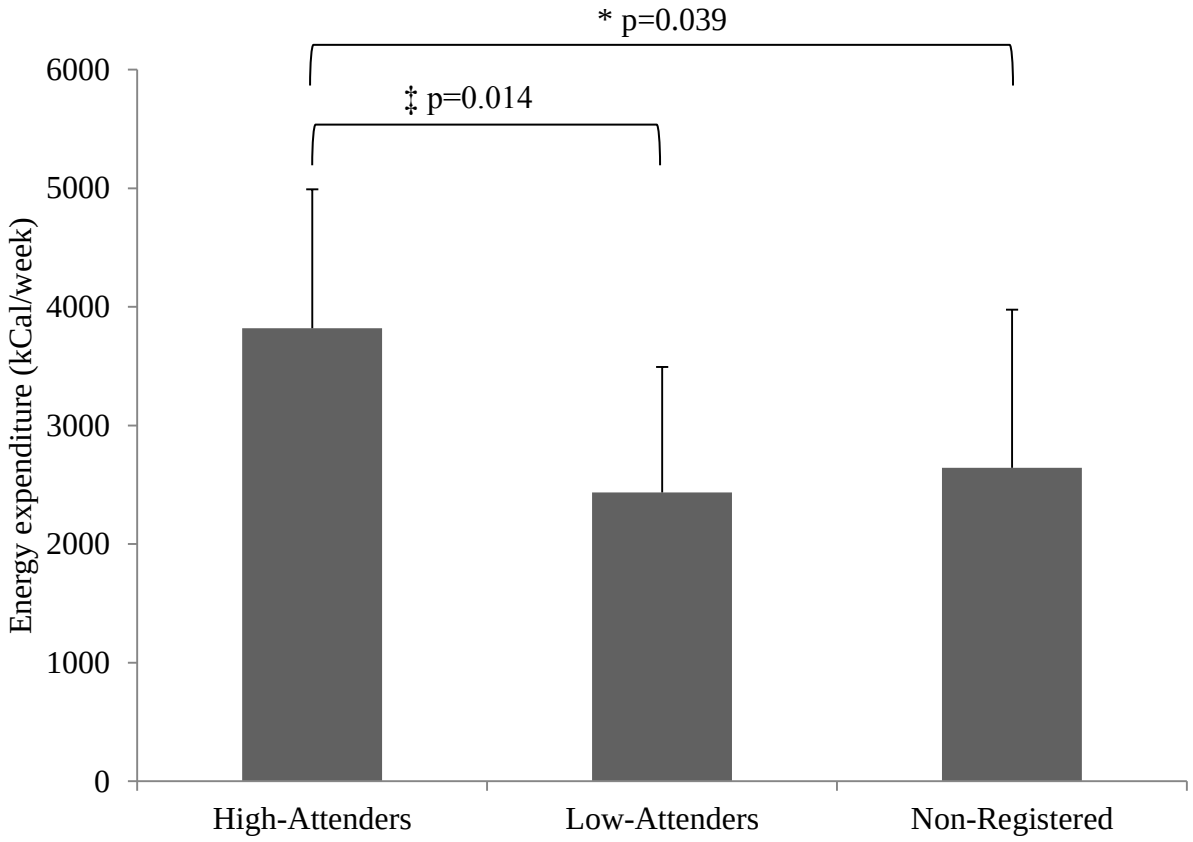

Figure 11. Total energy expenditure over a seven day period across the three study groups
*p < 0.05 for HA versus NR
‡p < 0.05 HA versus LA

Table 15. *Quality of life (SF36-v2) sub-scales across study groups*

	Total (n=44)	HA (n=11)	LA (n=16)	NR (n=17)	p-value
Quality of life subscales (mean ± SD)					
Social function	94.6 ± 11.2	92.0 ± 15.1	91.4 ± 12.7	99.3 ± 3.0	0.089
Vitality	69.3 ± 14.8	64.2 ± 16.8	67.6 ± 13.7	74.3 ± 13.6	0.180
Role limitations - Emotional	93.8 ± 12.3	88.6 ± 16.4	94.3 ± 10.9	96.6 ± 10.2	0.251
Role limitations - Physical	84.0 ± 20.4	84.1 ± 22.1	79.5 ± 24.2	88.3 ± 14.9	0.469
General health	77.84 ± 14.1	74.6 ± 11.2	79.3 ± 15.2	78.7 ± 15.0	0.674
Physical functioning	85.5 ± 15.6	86.4 ± 16.1	82.8 ± 18.9	87.4 ± 12.0	0.699
Body pain	79.0 ± 22.2	77.8 ± 22.5	76.1 ± 22.6	82.5 ± 16.4	0.699
Mental health	85.7 ± 11.7	86.8 ± 12.9	85.3 ± 10.6	85.3 ± 12.7	0.937

Continuous data are reported as mean ± SD

Chapter Five: Discussion

In using the Health-Belief Model to investigate the reasons of different attendance rates to maintenance community-based CR the current study has found the following:

1. There were no statistically significant differences in perceived threat (individual perceptions) of CAD between the three study groups, which was different from results found in previous studies and therefore disproves the hypothesis.
2. From cues to action differences were found between the three study groups in external factors, such as family, newsletters and others having heart problems, as well as internal factors such as worry about health and not wanting another heart attack. The NR group perceived some factors as discouraging, such as other health-professionals and education about maintenance community-based CR. These results support the hypothesis in that HA perceived more encouragement and NR perceived discouraging factors. However the LA group also did not perceived discouraging factors to attending, disproving that part of the hypothesis.
3. In perceived benefits differences were seen between the three study groups in the factors of ability to perform activities of daily living, social standing, body functioning, sense of accomplishment, muscle strength, cardiovascular functioning and being at ease with people. These results support the hypothesis in that the HA group perceived more benefits from attending maintenance community-based CR compared to the LA and NR groups.
4. In perceived barriers, HA and LA groups did perceive the need for maintenance community-based CR compared to NR. The LA and NR groups also reported many other barriers to attending maintenance community-based CR compared to HA.

This somewhat supports the hypothesis that the HA group would perceive less barriers to attending maintenance community-based CR.

5. The only difference seen in outcome measures were that the HA group had a higher physical activity level compared to the LA and NR groups, no other differences were seen in physical functioning or quality of life. The results therefore have only partially proven the hypothesis that the HA group would have better outcome measures compared to the LA and NR groups.

5.1 The Health-Belief Model Theoretical Framework

The Health-Belief Model has been previously used to examine the predictors of attendance to CR [57]. The current study however has used the Health-Belief Model as a theoretical framework to aid in the understanding of reasons and outcomes of different attendance rates to maintenance community-based CR programmes (Figure 12). Findings from existing literature and the current study have been examined using this framework and discussed under the following headings: individual perceptions (perceived threat) which leads into modifying factors (cues to action and sociodemographic characteristics) and along with perceived barriers, perceived benefits which form the cost-benefit analysis which leads on to the likelihood to action. The outcomes that were measured in the current study are also discussed under the headings of the Health-Belief Model to further understand their possible role in the decision to attend maintenance community-based CR. Demographic factors, medical history, medications, CAD symptoms and physical activity levels are discussed under the sociodemographic characteristics heading. Anthropometry, resting haemodynamic, physical functioning, physical activity levels and quality of life scores are discussed under perceived benefits. And finally transportation issues and distance to the nearest maintenance community-based CR programme are discussed under perceived barriers.

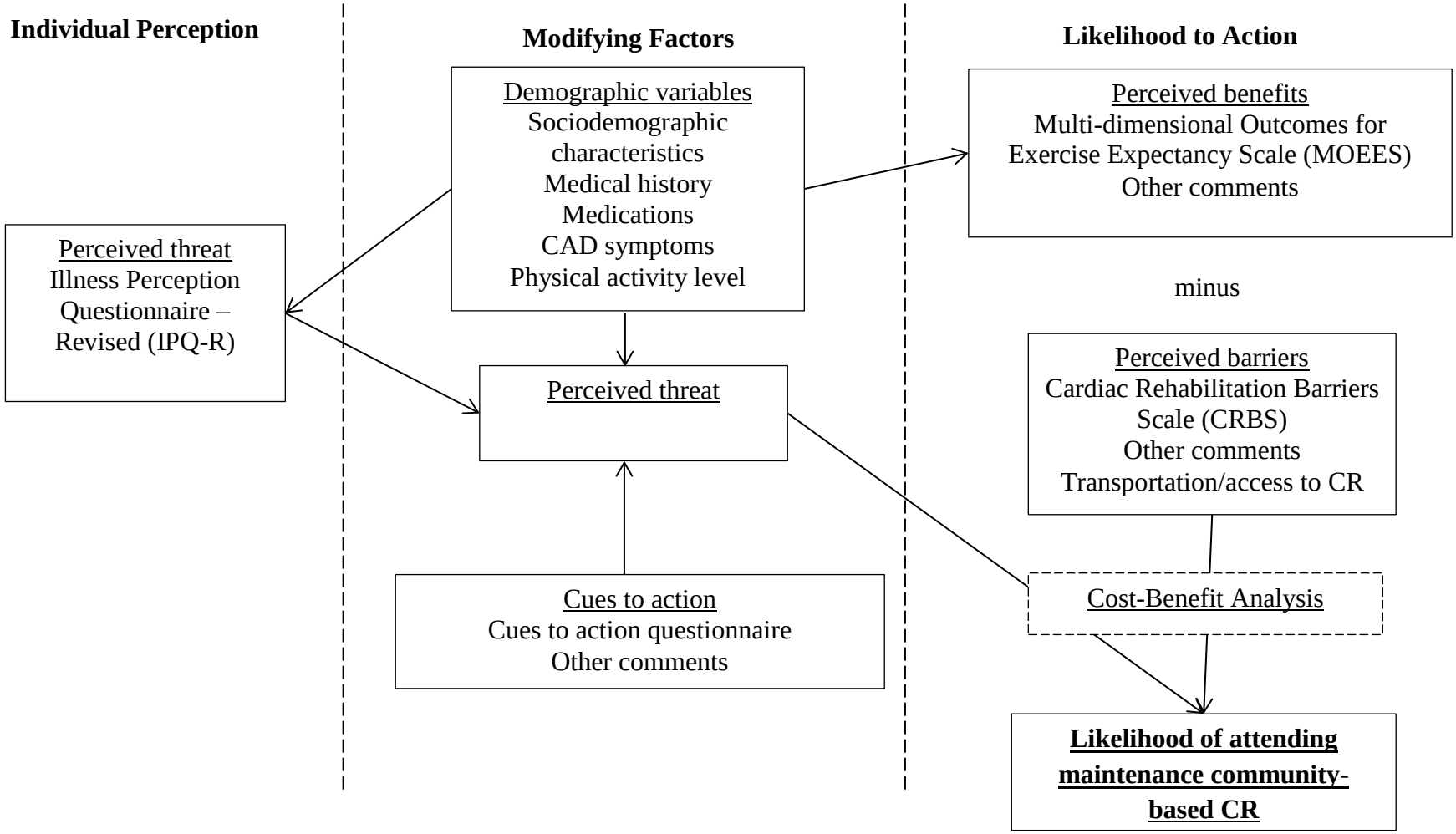

Figure 12. The use of the Health-Belief Model in the current study: Adapted with permission from Lippincott Williams and Wilkins/Wolters Kluwer Health: [MEDICAL CARE] [44], copyright (1975)
CAD=coronary artery disease; CR=cardiac rehabilitation

5.2 Individual Perceptions

In the Health-Belief Model individual perceptions consists of perceived severity and perceived susceptibility of the disease [43, 90]. The current study only examined perceived severity as all participants had a history of CAD and therefore perceived susceptibility was deemed as irrelevant. This variable has been referred to as perceived threat throughout the thesis.

5.2.1 Perceived Threat

Perceived threat of CAD has been found to affect attendance to CR in previous studies [30, 40, 55-58]. However, the current study has found no differences in the perceived threat of CAD between the three study groups according to results from IPQ-R. There were differences found between self-reported medical history of angina (Table 3) and symptoms of fainting and blackouts (Table 4) which could suggest differences in threat of CAD. The results on the effect of perceived threat are therefore inconclusive and further studies will need to investigate this.

Some studies have used the Illness Perception Questionnaire – Revised to examine the effect of differences in the perceived threat of CAD on attendance to CR [30, 55, 56]. Comparing the results from these other studies to the current study it has been found that patients in the current study have a more chronic and less cyclical view of the nature of their CAD, as well as lower consequences and treatment control, but higher perceived personal control over CAD [55, 56]. Even though there were no statistically significant differences between the three groups, the HA study group did perceive higher consequences compared to the LA and NR study groups, which could have affected attendance [55, 56].

Another study, using qualitative interviewing, found that low-attenders and non-attenders perceived they had little control over the disease and referred to the difficultly and

changes it presented in their lives [40]. Whereas the high-attenders group referred to the difficulties and challenges faced with the disease in past tense and viewed their disease as manageable [40]. The current study however did not confirm the findings of this study, that it found no differences between the three study groups in perceived control (either personal or treatment) or consequences. The differences seen between the previous and current study could be related to the difference in time since the cardiac event to the time the patients were examined, with the previous study examining out-patient CR patients [91], while the current study has examined maintenance community-based CR.

From the current study it appears that the factor of perceived threat may not be relevant in the contribution of the cost-benefit analysis that aids in decision around attending maintenance community-based CR, based on findings from IPQ-R. However when considering the self-reported medical history data differences are seen, with a higher reported rate of angina and blackouts and fainting in the HA group compared to both the LA and NR groups. Further studies will need to be conducted to determine if perceived threat had an effect on attendance to maintenance community-based CR.

5.3 Modifying Factors

In the Health-Belief Model the perceived threat of the disease is affected by the patients' sociodemographic characteristics and cues to action around undergoing a health-behaviour. As discussed above, the current study found no differences in the perceived threat of the CAD and patients viewed the disease as having moderate consequences and a high level of personal control over the disease. Therefore in this section the sociodemographic characteristics and cues to action factors of the Health-Belief Model are discussed as separate factors as to their possible effects on attendance to maintenance community-based CR programmes.

5.3.1 Sociodemographic characteristics

The sociodemographic characteristics factor of the Health-Belief Model takes into account the patients' age, gender, education and socioeconomic status [43, 44, 57]. Previous studies have found that these demographic factors, as well as others such as minority ethnicities [60], presence of angina [21] and no spousal support [46] have been associated with low attendance to CR programmes. The current study did not confirm previous studies as no differences were found for age, gender, ethnicity, socioeconomic status and educational levels. Furthermore the current study has found differences compared to previous studies as the HA group had a higher prevalence of angina, dizziness, fainting and blackouts than the LA and NR study groups. The findings from this study and that of previous studies do however support the need for demographic factors to be included in the Health-Belief Model when examining reasons for attendance to maintenance community-based CR programmes.

5.3.2 Cues to Action

Previous studies have found that factors such as social support [62, 63], family/spousal support [22, 46, 62], health-related factors [23, 30, 39, 62, 63], health professionals [21, 32, 61-63], self-motivation [32], financial issues [47, 48, 62] and education about CR [32, 33, 47, 63] affect attendance rates to CR programmes. These previous studies have found that most of these factors either encourage attendance or a lack of the factor is associated with low attendance. Financial issues appear to be the only factor that actively discouraged attendance to CR programmes.

Differences were found between the three study groups for cues to action, which included finding encouraging and discouraging factors to attending maintenance community-based CR. The factors of worry about health, not wanting another heart attack, newsletters, cardiology team, self-motivation, health, social and obligation were seen as

encouraging. The factors of family, financial issues and education were seen as both encouraging and discouraging by different patients. And finally the factor of other health-professionals was seen as discouraging to attending maintenance community-based CR. The results on cues to action are discussed below in terms of social support (including family, newsletters, and social factors), health related factors (worry about health, do not want another heart attack and health factors), health professionals (the cardiology team and other health professionals) self-motivation, financial issues, education about CR and obligation.

Social support, including family support has been found in previous studies to have a positive effect on attendance rates to CR programmes [21, 22, 62, 63]. The current study supports previous studies findings as it has also found family support to have an effect with the LA group receiving more encouragement from their family than the NR group. Themes that emerged from the cues to action comments also included family (HA, LA and NR study groups), and social aspects (HA and NR group) are also consistent with previous findings [21], especially as the family theme for the current study included spousal support. However, in the current study receiving social support through newsletters distributed from the maintenance community-based CR programmes also provided encouragement for the HA study group. This finding has not been previously reported in the literature and could be due to two reasons. It may be that other maintenance community-based CR programmes do not have monthly newsletters that help keep members involved in the CR club, or other studies may not have thought to examine the effect newsletters may have on attendance.

Health-related factors have been found to encourage attendance, as patients' recognise that CR can aid in improving health [23, 39, 62, 63] and preventing another myocardial infarction [62]. The current study supports findings from previous studies with health-related factors encouraging attendance to maintenance community-based CR. Patients were encouraged to attend maintenance community-based CR due to worry about

their health and not wanting another heart attack, as well as stating how attending maintenance community-based can aid in improving their health. Educating patients during the early phases of CR on the ability for maintenance community-based CR programmes to aid in secondary prevention of cardiac events may help increase attendance.

Previous studies have found encouragement to attend CR programmes from health-professionals support and provision of information on attendance to CR programmes [21, 32, 62, 63] improved CR attendance. In the current study health-professionals support and advice does appear to have an impact on attendance to maintenance community-based CR. However the patients' in the current study identified a split in this impact when comparing the cardiology team and other health-professionals. The cardiology team consistently appeared as supportive and informative, which encouraged attendance across all the study groups. However, other health-professionals were identified as separate and were reported to be lacking in either the information or support they provided CAD patients', similar to findings from previous studies [21, 32, 62]. Future studies should also make a distinction between the support and information provided from the cardiology team and other health-professionals to determine exactly where the lack in referral, support and encouragement is for attending CR programmes. As suggested previously there could be different areas where referral and information is lacking where different health-professionals are unsure of how they fit within cardiac care [61]. It has been suggested that offering education to other health professionals may be the answer to encourage the support given to CAD patients about CR programmes [62].

Self-motivation can be an encouraging factor in attending CR programmes [21, 32]. In the current study, self-motivation was identified by both the HA and LA study groups as part of the reason why they attended maintenance community-based CR. Delivering motivational interviewing has been linked to improving exercise behaviour [67]. These

results suggest that motivational interviewing could be included in early stages of CR to encourage attendance to maintenance community-based CR.

Financial issues is an issue that in previous studies actively discouraged attendance to CR programmes [47, 48, 62], whereas in the current study the theme of financial issues was found to both encourage and discourage attendance to maintenance community-based CR. Previous studies have found that patients viewed the cost of attending CR programmes is too great, particularly when healthcare insurance will not cover it [47, 48, 62]. The current study was based in New Zealand which has a different medical funding model and therefore medical insurance issues are only relevant if the patient decided to seek private medical attention. Therefore the current study found different results to previous studies in that patients either viewed financial issues of attending maintenance community-based CR as either encouraging or discouraging depending on their own financial views and situation. These results however were not related to the cost of health-care from a medical insurance perspective. It is therefore difficult to draw conclusions on the effect of financial issues in the current situation.

Education has been found to discourage attendance to CR programmes when it has been insufficiently provided [32, 63], or encourage attendance when it has been adequately provided [33]. The current study has also found the education has either encouraged or discouraged attendance in some patients in the NR study group. Two of the participants viewed cardiac education as encouraging, while one decided that maintenance community-based CR was not for them based on the information they had received from an educational seminar. This suggests that education does still need to be included, but what education and how it is provided may need to be revised. Further research will need to be conducted to determine what level of education, and what delivery of that education would be the most beneficial for encouraging attendance to maintenance community-based CR programmes [92].

Obligation was the final factor to emerge for cues to action in attending maintenance community-based CR. In this factor a participant stated how they felt obliged to attend as they were a part of the committee involved in running the maintenance community-based CR club. Other studies have suggested that one way to help improve attendance continuation of CR is to involve the community and patients [39]. The clubs examined in the current study do exactly that with the patients themselves involved in the logistics and running of the maintenance community-based CR programmes. From the response of obligation it seems that this is an effective way of creating a connection to the maintenance community-based CR programme for patients which helps to ensure attendance. Ensuring that this obligation was seen in a positive frame and not negative could be an issue which might need to be explored.

Therefore the current study confirmed the findings from previous literature that social support [62], family support [22, 62], health-related factors [62], health professionals [32], self-motivation [32], financial issues [47, 62] and education [32, 33] factors affect attendance rates to CR programmes. The current study has also identified new factors including newsletters, others having heart problems, encouragement from financial factors, differences in the cardiology team and health-professionals encouragement and an obligation to attend. The results from the current study support the need to consider cues to action when examining reasons for attending maintenance community-based CR programmes. However, it also illustrates some areas such as using newsletters, the cardiology team's involvement and having the patients themselves involved in the programme that could be used to promote maintenance community-based CR to increase attendance. Future studies will need to examine the effects of targeted promotion, using the above cues to action factors, would have on attendance to maintenance community-based CR programmes.

5.3 Likelihood to Action

In the likelihood to action section of the Health-Belief Model, the different components come together to form the cost-benefit analysis. This consists of the weighing up of the conditions in perceived threat, perceived barriers and perceived benefits to determine if the benefits outweigh the costs. With the current study the likelihood to action refers to different attendance rates to maintenance community-based CR programmes. None of the studies that have examined attendance to CR have looked at this specifically. However, one study has found a lack of perceived benefits gained does results in lower attendance, suggesting that the gains were viewed as low compared to the cost [40]. The perceived benefits and perceived barriers from the current study are discussed separately below and then the cost-benefit analysis is discussed.

5.3.1 Perceived Benefits

Previous studies have examined the effects of perceived benefits from attending CR programmes [21, 25, 40], and measured benefits gained from attendance [3, 12, 13, 35, 64, 65]. Interestingly from the current study the results show no differences in measured physical and psychological benefits, however there are differences in the perceived benefits gained. The lack of differences between the measured physical and psychological benefits seen can be attributed to the study's limitations of sample size and unrepresentative sample of the cardiac patient population. However, that is not to say that the perception of the gain of these benefits is still not an important addition to the literature [40, 69].

Although, perceived benefits have not been examined as extensively as barriers, a perceived lack of benefits has been found to have an effect on attending CR [21, 40]. These benefits include physical benefits (reduction in risk factors of CAD, improvement of cardiovascular functioning, increase in physical activity level, improved cardiovascular fitness, muscle strength, anthropometric and resting haemodynamic values) [3, 12, 26, 65,

68, 93], social aspects (social support network) [25, 40, 63], psychological well-being (psychological well-being, and quality of life) [3, 86] and enjoyment (variety of exercises and enjoyment) [63, 94].

Interestingly from the current study there was a large range of differences between study groups in the perceived benefits gained but not from measureable benefits (physical functioning and quality of life) from attending maintenance community-based CR. From the current study the survey results found attenders perceived more of a gain from the following benefits: ability to perform activities of daily living, body functioning, muscle strength, cardiovascular system functioning, social standing and sense of accomplishment. Whereas the HA study group perceived more of a gain in the benefits of social standing and being at ease with people compared to the LA study group. From the other comments social aspects is a common theme across all three study groups and physical benefits and expertise are also seen as benefits from attending maintenance community-based CR from the HA and LA study groups. Other themes that emerged from comments of perceived benefits were the variety of the exercises available (HA) and enjoyment from attending (LA). The themes found from previous literature and the current study have been categorised into physical benefits (reduction in risk factors of CAD, improvement of cardiovascular functioning, increase in physical activity level, improved cardiovascular fitness, ability to perform activities of daily living, body functioning, muscle strength and perceived physical benefits), social aspects (social standing, being at ease with people and social aspects), psychological well-being (quality of life and psychological well-being), sense of accomplishment, expertise, variety of exercises and enjoyment.

Numerous studies have found measurable physical benefits when comparing attenders and non-attenders to CR programmes [3, 12, 26, 65, 68, 93]. However, only a few previous studies have examined perceived physical benefits of attending CR programmes [68, 95, 96].

The current study found no differences in measurable physical benefits of physical functioning (short physical performance battery), muscle strength (hand-grip and 30 second chair to stand test) and cardiovascular fitness (six-minute walk test), anthropometric (waist to hip ratio, waist circumference, and body mass index scores) or resting haemodynamic (heart rate and blood pressure measures) values. One possible explanation for the lack of differences in measurable physical benefits between the groups, is that pharmacotherapy has been found effective at reducing risk factors for those who have not attended CR [97]. It has also been found in a previous study that elderly do not develop as much of an improvement in physical benefits compared to middle-aged patients' [98]. There are also some limitations in the studies statistical power due to a small sample size [99], and the length in time since the cardiac event [13]Even though there were no measurable physical benefits seen there was a difference in the perceived physical gains, such as the ability to perform activities of daily living, and improved body functioning, muscle strength and cardiovascular system functioning from attending maintenance community-based CR. As physical benefits may not be gained as prominently compared to that of middle-aged patients and the gains made from earlier phase of CR it shows the for maintenance community-based CR to be viewed for their holistic approach to healthcare and how they can offer more than measurable physical benefits as those listed above [65].

Social support has been found to be important for CAD patients as it is associated with a decreased perceived illness severity [100], and attendance to CR programmes [25, 40, 63]. The current study found that there was a perceived gain in social standing (HA versus LA and NR) and being at ease with people (HA versus LA) and social factors in general (all study groups). These findings support that of previous studies that the social aspect of being involved in a CR programme is valued [25] and seen as a real gain [40]. This further supports the notion that the holistic approach of maintenance community-based

CR may be the most important factor [39, 65], as it appears that perceived gains from attending maintenance community-based CR are more than physical outcomes.

Psychological well-being is another benefit found from attending CR programmes in previous studies [3, 86]. However in the current study no variables individually suggested that gains in psychological well-being were perceived differently between the groups, similarly no differences were found in the scores from the quality of life questionnaire. The current study therefore has inconsistent findings compared to previous studies indicating improved psychological well-being from attending CR [3, 86]. However, this may not be the case as there are inconsistencies in the literature as to how sensitive the SF36 is in detecting changes in the quality of life of CAD patients [101]. Although there were no differences between the three study groups, suggesting no effect from attending maintenance community-based CR, the scores obtained from the current study are greater than those reported for other CAD patients [102, 103]. One possible reason for the differences seen between the current study and previous studies could be due to how physically active the patients were in the current study, as undergoing exercise can improve quality of life in cardiac patients [104]. Another reason for the absence of differences observed could also be due to the small sample size from the current study. One way to determine the effects of attending maintenance community-based CR on quality of life would be to survey all patients post out-patient CR and not just those who volunteered.

Valuing access to expertise has been reported in a previous study examining patients experiences of an out-patient CR programme [40]. The current study also found that both the HA and LA study groups valued the access to expertise that was offered from attending maintenance community-based CR programmes. Participants valued the expertise not only of the health-professionals and fitness instructors, but also gained from interaction with like-minded people [40]. Having access to people who know about the CAD

conditions and how to manage the disease is seen as a benefit and therefore this feature could be used to help promote attendance to maintenance community-based CR.

One previous study examined how the exercises offered at CR and enjoyment from CR are positive factors affecting attendance [63]. In that study, similar to the current study, patients commented on how CR gave them a range of exercises they normally would not do and that there was a fun element [63]. This is important as making sure exercise is enjoyable can lead to increase adherence to exercise [94, 105]. Enjoyment and variety in the exercises available also appear to have a positive effect on attendance rates to CR and show how CR programmes offer more to the patient than measurable physical benefits [63]. This is important as it highlights the importance of a holistic approach in CR for providing benefits beyond measurable physical benefits.

Therefore, the results from the current study have supported previous findings on the factors of physical benefits, social benefits, expertise and enjoyment. The most interesting findings from this current study is that there were strong beliefs from both the HA and LA study groups of the perceived benefits from attending maintenance community-based CR. This is despite the findings of no differences in physical or psychological outcomes from attending maintenance community-based CR. This adds to the literature that the most important factor for those who are attending maintenance community-based CR are perceived benefits rather than measurable benefits, showing the need for a holistic approach in CR programmes.

5.3.2 Perceived Barriers

There have been many studies that have examined the barriers to attending CR programmes [22-24, 30-33, 40, 46, 47, 106]. However, a novel aspect of the current study was using CRBS questionnaire to examine barriers to attending maintenance community-based CR programmes. The perception of more barriers has been linked with low or no

attendance to CR programmes [23, 68]. Even though most of the studies are examining barriers to in-patient and out-patient CR, many of the factors are the same as those found in the current study [30, 31, 33, 35, 40, 47]. However, the current study has also found a new factor in the impact of weather on transportation, which could be expanded on in future studies. Therefore the current study has added an additional factor to the literature to consider when examining reasons for different attendance rates to maintenance community-based CR programmes.

When examining reasons behind attendance to CR programmes, the barriers to attendance have been examined most frequently. Barriers identified in previous studies have included factors such as transportation/access to CR [22-24, 32, 33, 35, 46, 47], perception of not needing CR [23, 30, 31, 33], not being interested in being involved in a CR programme [31], the structure of CR programmes [23, 30, 31, 40, 46], lack of education/referral to CR [22, 31-33, 35, 40], physical barriers [28, 31, 40, 48] and financial issues [26, 35]. From the previous literature the perceived barriers to attending CR appears to be the most influential factor that affects decision making.

The only difference found in perceived barriers for the present study was that the NR study group did not perceive the need for maintenance community-based CR compared to the HA and LA groups. From the other comments the common theme across all three study groups was other commitments. The LA and NR study groups also perceived the format of the CR programmes, unawareness of the CR programmes, and comorbidities as other barriers to attending. HA and LA both perceived weather as a possible barrier to attending. The most prevalent theme in the NR group for not attending maintenance community-based CR was undertaking their own exercise. This is an interesting finding as it may account for no statistically significant differences observed between the three study groups in physical functioning outcomes. However, the NR study group did show a significantly lower physical activity level compared to HA and LA and therefore

participants in NR may still need education around how to undergo their own exercise routine. Other themes that developed from the other comments included physical barriers from the HA study group (illness and injury), and the stigma of CR programmes from the LA study groups.

The findings from previous studies and the current study have been discussed in terms of the transportation/access to CR (weather), perceived need for CR (including perceived need for maintenance community-based CR and doing own exercise), the structure of the maintenance community-based CR programmes (including other commitments and the format of the CR programmes), education about CR (including unawareness of CR and the stigma of the CR programmes) and physical barriers (including comorbidities and physical aspects).

One of the most common barriers to attend CR programmes found in previous studies is transportation and access to CR issues [22-24, 32, 33, 35, 46, 47]. This includes the distance to travel to the CR programme being too great, inadequate access from public transport and/or inability to drive [22-24, 32, 33, 35, 46, 47]. The current study examined the distance from the patients' home to the nearest maintenance community-based CR programme in Dunedin as well as if they had a current drivers licence and/or access to transportation to CR clubs. There were no significant differences between the three groups suggesting that transportation was not an issue for the patients involved in the current study. However, it should be noted however that patients recruited for the current study had to be based in the greater Dunedin area to be able to attend the testing visit. This means that patients who were treated at the Dunedin Hospital but reside outside of the Dunedin area were excluded from the current study, and these patients may have faced greater transportation and/or access issues in attending maintenance community-based CR. In the current study snow or icy conditions made transportation to the maintenance community-based CR clubs difficult and were perceived as a barrier. However, the maintenance

community-based CR exercise sessions tend to be cancelled on particularly snowy or icy days which could make dangerous driving conditions. Therefore the issue of transportation may not be a major barrier for the particular sample of patients recruited for the current study.

Perceived need for CR has been shown to be a factor that affects attendance [23, 30, 31, 33]. Participants do not attend if they do not believe that they need to attend. This barrier was also seen in the current study in that the NR group did not perceive the need for maintenance community-based CR. The theme of undertaking their 'own exercise' from the NR group is similar to that of the belief that they do not need maintenance community-based CR. This is a theme that was found in another study in which one of the most common phrases to explain non-attendance was "can deal with by myself" [23]. This barrier raises an interesting point as to what should be on offer for those who attend maintenance community-based CR, if those who are not attending are keeping physically active by themselves. This once again brings back the issue of wellness and the impact that a maintenance community-based CR programme could have on this due to a holistic approach in healthcare needs.

The structure of CR programmes has been found as a common barrier in previous studies with things such as inconvenient timing, exercises not suitable, group format and/or a perceived lack in the benefits gained [23, 30, 31, 40, 46]. The current study also found structural problems as a barrier to attending with other commitments and the format of exercise classes. Therefore the current study has supported previous findings in that some patients view the structure of CR programmes unsuitable to them and their lifestyle. This once again raises the need for a holistic approach to healthcare and being able to provide support and means of healthcare they can suit those who struggle to attend a scheduled session, while still providing a structure care system for those who do currently attend maintenance community-based CR. The issue with structured and scheduled CR

programmes has been considered, with trials been undertaken on web-based or telephone based CR programmes [107, 108]. This is a possible solution for ensuring those who do not attend structured CR programmes still receive education and support.

A lack of education about CR and/or referral to CR has been viewed as a barrier to attending CR from previous studies [22, 31-33, 35, 40, 69]. One study examining health professionals beliefs around CR programmes found that one of the reasons health professionals thought there was a poor uptake in maintenance community-based phases was due to a lack in information flow from the hospital based phases to the maintenance community-based phase [32]. Although a lack of referral was not specifically seen as a barrier in the current study, education about maintenance community-based CR and the awareness of such clubs were seen as barriers. Both the LA and NR study groups identified unawareness of maintenance community-based CR programmes, which could further point to a lack of referral as stated above in cues to action. Also as a participant in the LA study group stated there was a stigma in belonging to a heart group, which also suggests as to a lack of education about what is involved in maintenance community-based CR programmes.

Physical barriers, defined as a comorbidity, illness, injury or fatigue, have been found in previous studies to be a barrier to attending CR programmes [31, 40, 48]. Consistent with previous studies, the current study found physical barriers including comorbidities, injury and/or fatigue to be barriers to attending maintenance community-based CR. However solutions on how to overcome this barrier may not be so simple. The best course of action would be ensuring that maintenance community-based CR programmes include individualised support and exercise advice to consider all health conditions. This could also be achieved through web or telephone based systems offering education and advice on the best means to maintain health-behaviours for each individual and their needs.

Therefore, the results found from the current study support barriers to CR attendance identified in previous studies including patients' perceived need for maintenance community-based CR, the structure of the maintenance community-based CR club, education about CR and physical barriers. The NR and LA study groups reported more barrier themes than the HA study group, suggesting they may perceive more barriers to attending. Examination of how these perceived barriers to attending maintenance community-based CR could be overcome should be further explored with an intervention based study in which some of these barriers are targeted with specific strategies.

5.3.3 Cost-Benefit Analysis

From the findings of the current study it appears that the cost benefit analysis part of the Health-Belief Model is integral in the decision to attend maintenance community-based CR programmes. The results from the current study have been presented in the Health-Belief Model framework (Figure 13). This enables a depiction of the findings on reasons and outcomes of attending maintenance community-based CR programmes at different attendance rates in a summarised version.

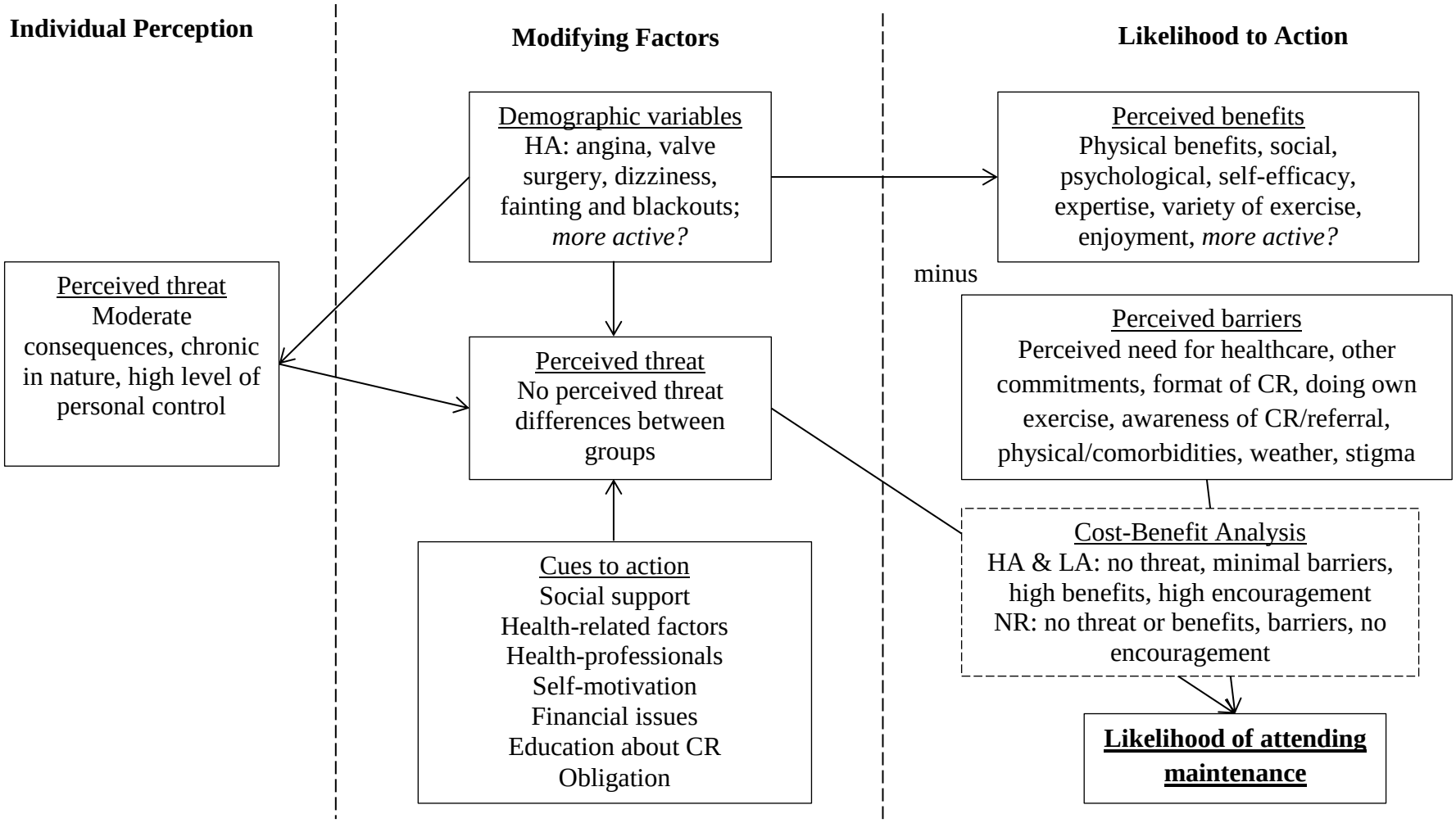

Figure 13. The results of the current study presented within the Health-Belief Model framework: Adapted with permission from Lippincott Williams and Wilkins/Wolters Kluwer Health: [MEDICAL CARE] [44], copyright (1975)
HA=high-attenders; LA=low-attenders; NR=non-registered; CR=cardiac rehabilitation

5.4 Study Implications

Findings from the literature have stated that there is an issue of low attendance to structured CR programmes [15, 38]. This is an issue as CR can provide benefits to the attenders, which can aid in improving mortality and morbidity [47, 109]. Attending CR programmes can also provide psychological well-being through social support and education to be able to accomplish tasks post cardiac event [9]. The current study has examined the reasons and outcomes of different attendance rates to maintenance community-based CR. It has found that attenders (HA and LA) perceive more benefits from attending that the NR study group, whereas the NR study group had a low perceived need to attend CR and actually do their own exercise routine to take care of their health.

The findings from this study can be used by CR programmes to either directly encourage attendance through promotion measures such as using newsletters or providing education to health-professionals to encourage attendance to their patients. Or it could be used to inform other CR programmes of some of the effective strategies that have already been implemented and appreciated by the maintenance community-based CR programmes examined. These include the patients being actively involved in the running of the maintenance community-based CR programmes, and a strong social support network set up by the members. This leads on to the importance of considering a holistic approach to healthcare.

The need for holistic care for CAD patients post cardiac event has already been found in several studies [22, 25, 31, 40, 109-111]. Holistic care includes lifestyle modification programmes include physical and psychological support and often include motivation strategies to long-term healthy behaviour initiation and maintenance [109]. A meta-analysis of lifestyle modification programmes (holistic CR programmes) have found that benefits can occur long-term for CAD patients [109]. Long-term benefits of lifestyle programmes have included reductions in all-cause mortality and cardiac mortality, a

decrease in reinfarction, reduced diastolic blood pressure, reduced body mass index and improved exercise and dietary habits [109]. The maintenance community-based CR programmes examined in the current study fall under the category of holistic care by providing comprehensive cardiac care support including twice weekly exercise sessions, access to expertise on lifestyle modifications and social support for the patient and spouses.

The maintenance community-based CR programmes examined in the current study already provide some of this holistic care to the patients to a certain extent, and this is reflected in results from perceived benefits in which factors such as social standing and being at ease with people developed. Attenders of these programmes perceive they are gaining benefits from attending, and these benefits are not just physical, but social and psychological. Having the programmes set up where the members themselves are the organising committee and aid in the funding and running of the programmes ensure they have a vested interest in its continuation. Therefore their attendance takes on a new dimension; it is no longer just about health on an individual level but at a community level, in that they all encourage each other to improve their health [39]. Members of the cardiology team, such as the cardiac nurse and physiotherapist are also involved in the maintenance community-based CR programme and therefore also aid in the referral and promotion process and will ask members of the club to attend out-patient seminars to encourage new members to attend. Even though there were no differences found between the HA, LA and NR groups in measurable physical and psychological benefits from attending maintenance community-based CR, the support and information provided is still perceived as beneficial. This supports findings from another study which found that not having access to a community-group meant patients felt disconnected and that they had lost social support and therefore felt unable and unmotivated to undertake healthy behaviour on their own [39].

The maintenance community-based CR programmes from the current study already have some strategies in place that give it a more holistic approach to health-care. These strategies are appreciated by patients who attend and even to a certain extent those who do not attend. Therefore the current study supports previous studies findings in that a holistic approach is needed to aid in health behaviour maintenance.

5.5 Study Limitations

The current has some limitations including issues with the cross-sectional design, selection bias, sample size, and measurement bias. These limitations are discussed below including the possible impact on results.

Using a cross-sectional design has meant that causal conclusion on the effects of attendance to maintenance community-based CR cannot be made. Therefore results obtained on participants' physical activity levels, physical functioning, medical conditions and mental and physical health cannot be definitively attributed to attendance rates to maintenance community-based CR. Even though it was found that the HA patients on average are the most active, it is difficult to determine if this is a reason they attend maintenance community-based CR or if this is an outcome of attending maintenance community-based CR. To determine this, patients would have to fill out a physical activity questionnaire, which would require the patients' to recall their physical activity levels pre cardiac event, which in itself has its own set of problems around recall [112] and participant bias [84]. A longitudinal designed examination would be able to determine the casual effects of attendance to maintenance community-based CR and is recommended as a future study option.

Selection bias was another limitation of the current study. Potential issues of the selection criteria was the potential of having an unrepresentative sample based on physical activity level, distance to the maintenance community-based CR programmes, and not

obtaining results from participants who had attended but dropped out of the programme. One reason why participants could have been mostly active (as seen in the physical activity data) is that those who were unable to walk independently were excluded from the study. Also as the study did involve some fitness testing, which can create a bias to an active sample, as sedentary will not want to participate and be seen as inactive (social desirability theory) [113]. Secondly, due to the nature of the study, only patients whom resided within the greater Dunedin area were recruited to take part in the study. This meant that other CAD patients from outside of this area were not included and this therefore could mean those with barriers such as transportation issues [47] not being represented in the current study. Including these patients from outside of the greater Dunedin area to complete the survey on their perceived severity, benefits, barriers and cues to action the reasons component of the study would have possibly provided some useful insights on how to best aid this population for long term healthcare maintenance. And lastly due to the selection criteria it has meant that participants who were previously attending maintenance community-based CR but dropped out prior to the study commencement will have been missed from the sample. This could have been an important group in finding out reasons for the drop-out [31]. If the reasons component of the study were open to all who had completed out-patient CR then other barriers may have emerged in the current study to support those of previous studies including exercise embarrassment [40], comorbidities preventing exercising [48], and not feeling active enough to join CR [30]. Knowing this information could give insights as to how to maintain attendance to maintenance community-based CR programmes once patients have registered.

The small sample size of the current study was a limitation as it has meant that the statistical power of the physical functioning and psychological benefits (quality of life) were not reached. Therefore there may have been an inability to detect significant

differences between the three study groups. This could be true for other physical measures that were carried out and the psychological test on quality of life, as a small sample size can increase type II error [99].

Lastly there was an issue of measurement bias which was a limitation of the current study. This included the measurement of medical history, perceived threat and perceived benefits. Using self-report for medical history may not be the most accurate, however it has been found to be reasonably accurate for well-defined chronic conditions [114]. The ideal method for collecting medical history data would be to have access to participants' medical records. This, however, was not possible due to the nature of the current study. Secondly, how perceived threat was measured could have caused the no differences between groups trend that was observed. If medical history and symptoms had of been considered a part of perceived threat and not just a part of demographics, then a difference could have been observed in that HA would have a higher perceived threat. Lastly, there was also the issue on outcome expectations not being synonymous with perceived benefits. Therefore there could have been issues with the interpretation of these results as being participants perceived benefits.

5.6 Recommendations for Future Studies

Based on the findings of the current study, future studies examining the reasons and outcomes of attending maintenance community-based CR for elderly CAD patients should consider the several approaches discussed below.

To determine the reasons for attending or not attending maintenance community-based CR all patients who have been discharged from the hospital after a cardiac event need to be invited to take part in the survey on perceived severity, benefits, barriers and cues to action. This will aid in collecting patients perspectives from a wider demographic and geographical range. It would also be useful to consider studying other parts of New Zealand

and examine what barriers are nationwide and which are regional to best aid referral practices and CR structures to suit as many CAD patients in New Zealand as possible.

Conducting randomised control trails using different encouragement methods noted from the cues to action part of the current study to determine which are the most effective at encouraging attendance. This includes the use of newsletters and education to general health-professionals so they can support CAD patients in their decision making. These should be set up with patients randomised into the intervention group (receiving newsletters or extra information and encouragement from GP) or control group (receiving no extra input than what is already available) at completion of out-patient CR. Then these patients can have their attendance tracked and be surveyed on why they chose to attend/not attend to determine their thoughts on how effective the encouragement cues were.

To determine the outcomes of attending maintenance community-based CR the most effective testing method would be a longitudinal study. This would involve collecting physical functioning, psychological and physical activity data at baseline (end of out-patient CR) and over several years. Comparing that data to the attendance data in conjunction with physical activity levels, would give a more accurate picture as to the long-term effects of attending maintenance community-based CR.

5.7 Conclusions

The current study found that perceived threat does not appear to have much of an effect on the decision to attend maintenance community-based despite a higher prevalence of angina and dizziness, fainting and blackouts in the HA group. In the cues to action factor results indicated that social support, family support, health-related factors, self-motivation, financial issues, education newsletters and the cardiology team affected attendance. Perceived benefits of attending consisted of physical, psychological, social, access to expertise, sense of accomplishment, the variety of exercise available and enjoyment.

Whereas barriers to attending community-based CR consisted of the perceived need to attend CR, structure of CR, education, physical barriers and patients undertaking their own exercise routine. In relation to the outcomes of attendance, results from the current study have shown that there was a higher physical activity level in the HA group compared to both the LA and NR groups.

The current study observed that perceived threat of the disease has little or no effect; if perceived benefits are high then attenders will be encouraged to attend, and perceived barriers have somewhat of an effect on attendance to maintenance community-based CR (Figure 13). The perceived benefits, perceived barriers and cues to action results could be used for intervention based studies examining effects of overcoming the barriers found on attendance rates to maintenance community-based CR. The current study has also raised issues that could lead to new directions and thought around long-term CR in future studies. This includes having the patients actively involved in the running of the maintenance community-based CR programmes, using newsletters to help encourage new members to be involved and creating greater awareness in the community and with other health-professionals.

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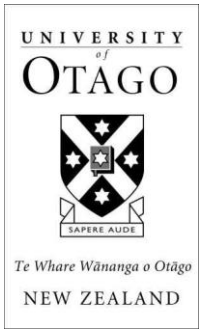
Appendix A: Information Sheet and Consent Form

Reference Number: 13/004
30/01/13



ATTENDANCE TO MAINTENANCE COMMUNITY-BASED CARDIAC REHABILITATION REASONS AND OUTCOMES INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?

This project is examining the reasons why people choose to either attend or not attend maintenance community-based cardiac rehabilitation as well as the outcomes from attending or not attending. This will help in making suggestions on how to improve the maintenance community-based cardiac rehabilitation services. This project is being undertaken as part of the requirements for the Master's Degree in Physical Education at the University of Otago.

What Type of Participants are being sought?

We are seeking male and female participants who are ≥60 years, have been diagnosed with coronary artery disease (had a heart attack, angina and/or heart surgery) and have completed an out-patient (phase II) cardiac rehabilitation program in Dunedin Hospital at least 6 months previously.

You will be unable to participate if you have been hospitalised for any cardiac problems including angina, heart attack, stroke or heart surgery in the past six months. had a recent heart attack or admission to hospital with chest pain, have chest pain coming on at rest, experience significant symptoms of palpitations, symptoms related to severe narrowing of the aortic valve, significant breathlessness and fluid build-up or swelling, lung clots, recent heart inflammation or inflammation of the sac surrounding the heart.

What will Participants be Asked to Do?

Should you agree to take part in this project, you will be asked to attend a 90 minute testing session at the School of Physical Education or the Taieri Bowling Club at Mosgiel, which will involve:

- Answering questionnaires about the reason for attending or not attending maintenance community-based cardiac rehabilitation
- Answering questionnaires about perceptions of your health and coronary artery disease
- Undergoing a short physical assessment that involves you to walk for 6 minutes (this will be completed twice). As a part of this test, you will be asked to walk as fast as possible for 6 minutes. You will be walking in a 60-meter loop. You will be able to rest during the test, if needed. You will be wearing a heart rate monitor and your heart rate will be recorded throughout the test. You may experience a temporary muscle soreness for a few days after this test.
- The testing will also involve taking home and using an accelerometer (physical activity measuring device) for 7 days and recording your physical activity in a log during the same time. Instructions will be given on how to use the accelerometer and fill out physical activity log. A prepaid addressed envelope will be provided so that the accelerometer and physical activity log can be sent back when finished.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

What Data or Information will be Collected and What Use will be Made of it?

Data will be collected on your age, gender, ethnicity, marital status, education level and physical living address. As well as the data from answering the questionnaires and undertaking the physical assessments as mentioned above.

In any cases where direct quotes are used from the questionnaires, a pseudo name will be used to protect your anonymity.

The data collected will be securely stored in such a way that only those mentioned below will be able to gain access to it. Data obtained as a result of the research will be retained for **at least 10 years** in secure storage. Any personal information held on you may be destroyed at the completion of the research even though the data derived from the research will, in most cases, be kept for much longer or possibly indefinitely.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity.

In agreeing to partake in this study you will receive your own personal physical activity and physical functioning level results from the study. You may request to correct or withdraw any of the information given at any stage during the project. You may also request a copy of the completed results.

Can Participants Change their Mind and Withdraw from the Project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:-

Hayley Horwood	and/or	Dr Sandra Mandic
School of Physical Education		School of Physical Education
University Telephone Number:- 479 9112		University Telephone Number:- 479 5415
Email Address hayley.horwood@otago.ac.nz		Email Addresssandra.mandic@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479 8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

If you have any queries or concerns regarding your rights as a participant in this research study you can contact an independent health and disability advocate. This is a free service provided under the Health and Disability Commissioner Act.

- Telephone (NZ wide): 0800 555 050.
- Free Fax (NZ wide): 0800 2787 7678 (0800 2 SUPPORT).
- Email (NZ wide): advocacy@hdc.org.nz.

Reference Number: 13/004
30/01/13

ATTENDANCE TO MAINTENANCE COMMUNITY-BASED CARDIAC REHABILITATION: REASONS AND OUTCOMES
CONSENT FORM FOR PARTICIPANTS

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:-

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project at any time without any disadvantage;

3. I give permission to have my attendance and registration data accessed from the Otago Phoenix Club or Taieri Fit and Fun Group, if applicable;

4. Personal identifying information (sociodemographic characteristics, medical history and physical living address) will be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

5. I am aware that physical assessment tasks are considered safe and carry a low risk of complications (asthma attack, musculoskeletal injury) and cardiac events (angina, heart attack) and that I can withdraw from the assessment at any stage and for any reason;

6. The results of the project may be published but I understand I will not be identified and the results will be available in the University of Otago Library (Dunedin, New Zealand).

I agree to take part in this project.

....

(Signature of participant) (Date)

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479 8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix B: Data Collection Sheets

Assessment Date: _____ Participant ID: _____

Project Title:

Attendance to Community-Based Cardiac Rehabilitation: Reasons and Outcomes

Contact Information

First name: _____

Middle name: _____

Last name: _____

Date of birth: _____ dd/mm/yyyy

Your contact information

Street address: _____

Town / City: _____

Postal code: _____

Contact phone number: _____

Email (optional): _____

About You

1. Age: ☐ years

2. Gender: ☐ Male ☐ Female

3. Which ethnic group do you belong to?

☐ 1 New Zealand European ☐ 4 Cook Island Maori ☐ 7 Chinese

☐ 2 Maori ☐ 5 Tongan ☐ 8 Indian

☐ 3 Samoan ☐ 6 Niuean ☐ 9 Other: Please state ☐

4. What is your marital status?

☐ 1 Single

☐ 2 Married / Living with a partner

☐ 3 Separated / divorced

☐ 4 Widowed

☐ 5 Other

5. What is your highest level of education?

☐ 1 Primary school

☐ 2 Secondary school to 5th form

☐ 3 Secondary school to 6th form

☐ 4 Secondary school to 7th form

☐ 5 Highest University degree: Please state ☐

☐ 6 Other qualifications: Please state ☐

	Yes	No
6. Do you have a current New Zealand Drivers Licence?	☐ 1	☐ 0
7. Do you have access to a car or other mode of transport to attend cardiac rehabilitation?	☐ 1	☐ 0

Medical History

In your **medical history**, have you had (or do you currently have) any of the following health conditions?

	Yes	No				
1. High blood pressure	☐ 1	☐ 0				
2. High cholesterol	☐ 1	☐ 0				
3. Diabetes	☐ 1	☐ 0	If yes:	☐ 2 Type I	☐ 3 Type II	
4. Smoking	☐ 1	☐ 0	If yes:	☐ 2 Current	☐ 3 Quit more than 6months ago	

	Yes	No	
5. Heart attack / myocardial infarction	☐ 1	☐ 0	If yes, in which year(s): ☐
6. Angina / chest pain	☐ 1	☐ 0	If yes, in which year(s): ☐
7. Bypass surgery	☐ 1	☐ 0	If yes, in which year(s): ☐
8. Valve surgery	☐ 1	☐ 0	If yes, in which year(s): ☐
9. Angioplasty or stent inserted	☐ 1	☐ 0	If yes, in which year(s): ☐
10. Pacemaker	☐ 1	☐ 0	If yes, in which year(s): ☐
11. Peripheral vascular disease	☐ 1	☐ 0	If yes, in which year(s): ☐
12. Heart failure	☐ 1	☐ 0	If yes, in which year(s): ☐
13. Mini stroke or TIA	☐ 1	☐ 0	If yes, in which year(s): ☐
14. Stroke	☐ 1	☐ 0	If yes, in which year(s): ☐
15. Other cardiovascular disease	☐ 1	☐ 0	If yes, please specify ☐

	Yes	No
16. Asthma	☐ 1	☐ 0
17. Chronic obstructive pulmonary disorder	☐ 1	☐ 0
18. Arthritis	☐ 1	☐ 0
19. Osteoporosis	☐ 1	☐ 0
20. Back pain or back problems	☐ 1	☐ 0
21. Anxiety disorder	☐ 1	☐ 0
22. Depression or mood disorder	☐ 1	☐ 0

23. Cancer

	Yes	No
a. Breast cancer	☐ 1	☐ 0
b. Colon cancer	☐ 1	☐ 0
c. Prostate cancer	☐ 1	☐ 0
d. Other cancer	☐ 1	☐ 0
24. Other physical health condition	☐ 1	☐ 0
25. Other mental health condition	☐ 1	☐ 0

26. Do you have…

	Yes	No
e. A father or brother who had a heart attack/surgery before the age of 55	☐ 1	☐ 0
f. A mother or a sister who had a heart attack/surgery before the age of 65	☐ 1	☐ 0

27. Have you experienced the following symptoms?

	Yes	No
g. Discomfort in the chest with exercise and exertion	☐ 1	☐ 0
h. Shortness of breath with mild exertion	☐ 1	☐ 0
i. Dizziness, fainting or blackouts	☐ 1	☐ 0
j. Burning or cramping sensation in your lower legs when walking short distances	☐ 1	☐ 0
k. Musculoskeletal problems that limit your physical activity	☐ 1	☐ 0

List of medications currently being taken

Name	Code
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Medication Type

☐$_1$ Beta Blocker

☐$_2$ ACE Inhibitor

☐$_3$ Calcium Channel Blocker

☐$_4$ Aspirin

☐$_5$ Lipid Lowering Agent

☐$_6$ Nitrate

☐$_7$ GTN Spray

☐$_8$ Diuretic

☐$_9$ Other Medications

Anthropometry and Resting Measures

Height (m): ☐

Weight (kg): ☐

Body Mass Index (kg/m^2): ☐

Waist circumference (cm): ☐

Hip circumference (cm): ☐

Waist to hip ratio: ☐

Resting Heart Rate (bpm): ☐

Resting Blood Pressure (mmHg): ☐

ILLNESS PERCEPTION QUESTIONNAIRE (IPQ-R)

Name…… ***Date……***

YOUR VIEWS ABOUT YOUR ILLNESS

We are interested in your own personal views of how you now see your current illness.

Please indicate how much you agree or disagree with the following statements about your illness by ticking the appropriate box.

	VIEWS ABOUT YOUR ILLNESS	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
IP1	My illness will last a short time					
IP2	My illness is likely to be permanent rather than temporary					
IP3	My illness will last for a long time					
IP4	This illness will pass quickly					
IP5	I expect to have this illness for the rest of my life					
IP6	My illness is a serious condition					
IP7	My illness has major consequences on my life					
IP8	My illness does not have much effect on my life					
IP9	My illness strongly affects the way others see me					
IP10	My illness has serious financial consequences					
IP11	My illness causes difficulties for those who are close to me					
IP12	There is a lot which I can do to control my symptoms					
IP13	What I do can determine whether my illness gets better or worse					
IP14	The course of my illness depends on me					
IP15	Nothing I do will affect my illness					
IP16	I have the power to influence my illness					
IP17	My actions will have no affect on the outcome of my illness					
IP18	My illness will improve in time					

IP19	**There is very little that can be done to improve my illness**					
IP20	**My treatment will be effective in curing my illness**					
	VIEWS ABOUT YOUR ILLNESS	**STRONGLY DISAGREE**	**DISAGREE**	**NEITHER AGREE NOR DISAGREE**	**AGREE**	**STRONGLY AGREE**
IP21	**The negative effects of my illness can be prevented (avoided) by my treatment**					
IP22	**My treatment can control my illness**					
IP23	**There is nothing which can help my condition**					
IP24	**The symptoms of my condition are puzzling to me**					
IP25	**My illness is a mystery to me**					
IP26	**I don't understand my illness**					
IP27	**My illness doesn't make any sense to me**					
IP28	**I have a clear picture or understanding of my condition**					
IP29	**The symptoms of my illness change a great deal from day to day**					
IP30	**My symptoms come and go in cycles**					
IP31	**My illness is very unpredictable**					
IP32	**I go through cycles in which my illness gets better and worse.**					

The Multidimensional Outcome Expectations for Exercise Scale

NB: This scale has been modified so that attendance to Community-Based Cardiac Rehabilitation is examined instead of exercise

The following items reflect your beliefs or expectations about benefits of regular attendance to Community-Based Cardiac Rehabilitation. Please respond to the following statements marking your answer honestly by ticking the appropriate number/statement. Remember to read each question carefully.

Attending Community-Based Cardiac Rehabilitation will…	**Strongly Disagree** 1	**Disagree** 2	**Neutral** 3	**Agree** 4	**Strongly Agree** 5
1. …improve my ability to perform daily activities	☐	☐	☐	☐	☐
2. …improve my social standing	☐	☐	☐	☐	☐
3. …improve my overall body functioning	☐	☐	☐	☐	☐
4. …help manage stress	☐	☐	☐	☐	☐
5. …strengthen my bones	☐	☐	☐	☐	☐
6. …improve my mood	☐	☐	☐	☐	☐
7. …increase my muscle strength	☐	☐	☐	☐	☐
8. …make me more at ease with people	☐	☐	☐	☐	☐
9. …aid in weight control	☐	☐	☐	☐	☐
10. …improve my psychological state	☐	☐	☐	☐	☐
11. …provide companionship	☐	☐	☐	☐	☐
12. …improve the functioning of my cardiovascular system	☐	☐	☐	☐	☐
13. …increase my mental alertness	☐	☐	☐	☐	☐
14. …increase my acceptance by others	☐	☐	☐	☐	☐
15. …give me a sense of accomplishment	☐	☐	☐	☐	☐
16. Other benefits (s) from attending a cardiac rehabilitation program:					

CARDIAC REHABILITATION BARRIERS SCALE

The following questions ask about some of the factors influencing your attendance at cardiac rehabilitation sessions. Please answer **all of the questions** on this page regardless of whether you attended or **did not** attend a cardiac rehabilitation program.

I did not attend a cardiac rehabilitation program, or if I did attend, I missed some sessions because:	**Strongly Disagree**	**Disagree**	**Neither Agree or Disagree**	**Agree**	**Strongly Agree**
1. …of distance (e.g., not located in your area, too far to travel)	☐	☐	☐	☐	☐
2. …of cost (e.g., parking, gas)	☐	☐	☐	☐	☐
3. …of transportation problems (e.g., access to car, public transportation)	☐	☐	☐	☐	☐
4. …of family responsibilities (e.g., caregiving)	☐	☐	☐	☐	☐
5. …I didn't know about cardiac rehab (e.g., doctor didn't tell me about it)	☐	☐	☐	☐	☐
6. …I don't need cardiac rehab (e.g., feel well, heart problem treated, not serious)	☐	☐	☐	☐	☐
7. …I already exercise at home, or in my community	☐	☐	☐	☐	☐
8. …severe weather	☐	☐	☐	☐	☐
9. …I find exercise tiring or painful	☐	☐	☐	☐	☐
10. …travel (e.g., holidays, business, cottage)	☐	☐	☐	☐	☐
11. …of time constraints (e.g., too busy, inconvenient class time)	☐	☐	☐	☐	☐
12. …of work responsibilities	☐	☐	☐	☐	☐
13. …I don't have the energy	☐	☐	☐	☐	☐
14. …other health problems prevent me from going (specify:_____)	☐	☐	☐	☐	☐
15. …I am too old	☐	☐	☐	☐	☐
16. …my doctor did not feel it was necessary	☐	☐	☐	☐	☐
17. … many people with heart problems don't go, and they are fine	☐	☐	☐	☐	☐
18. … I can manage my heart problem on my own	☐	☐	☐	☐	☐
19. … I think I was referred, but the rehab program didn't contact me	☐	☐	☐	☐	☐
20. …it took too long to get referred and into the program	☐	☐	☐	☐	☐
21. …I prefer to take care of my health alone, not in a group	☐	☐	☐	☐	☐

22. Other reason (s) for not attending a cardiac rehabilitation program:

Cues to Action Questionnaire

The following questions ask about some of the triggers influencing your attendance at cardiac rehabilitation sessions. Please answer **all of the questions** on this page regardless of whether you attended or **did not** attend a cardiac rehabilitation program.

The following triggers affected whether I did or did not attend Community-Based Cardiac Rehabilitation	**Strongly discourages me**	**Discourages me**	**Neither encourages nor discourages me**	**Encourages me**	**Strongly encourages me**
1. …the Doctor	☐	☐	☐	☐	☐
2. …my Family	☐	☐	☐	☐	☐
3. …my Friends	☐	☐	☐	☐	☐
4. …the symptoms of my Coronary Artery Disease	☐	☐	☐	☐	☐
5. …worry about my health	☐	☐	☐	☐	☐
6. …don't want another heart attack	☐	☐	☐	☐	☐
7. …education about what I can do for my heart health	☐	☐	☐	☐	☐
8. …TV advertisements about heart health	☐	☐	☐	☐	☐
9. …newsletters from the Cardiac Rehabilitation clubs	☐	☐	☐	☐	☐
10. …those around me having heart problems	☐	☐	☐	☐	☐
11. …having a family history of heart problems	☐	☐	☐	☐	☐
12. …other:					

Your Health and Well-Being

This questionnaire asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. ***Thank you for completing this questionnaire!***

For each of the following questions, please mark an ☒ in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. <u>Compared to one year ago</u>, how would you rate your health in general <u>now</u>?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

3. The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

		Yes, limited a lot	Yes, limited a little	No, not limited at all
a	<u>Vigorous activities</u>, such as running, lifting heavy objects, participating in strenuous sports	☐ 1	☐ 2	☐ 3
b	<u>Moderate activities</u>, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐ 1	☐ 2	☐ 3
c	Lifting or carrying groceries	☐ 1	☐ 2	☐ 3
d	Climbing <u>several</u> flights of stairs	☐ 1	☐ 2	☐ 3
e	Climbing <u>one</u> flight of stairs	☐ 1	☐ 2	☐ 3
f	Bending, kneeling, or stooping	☐ 1	☐ 2	☐ 3
g	Walking <u>more than a kilometre</u>	☐ 1	☐ 2	☐ 3
h	Walking <u>several hundred metres</u>	☐ 1	☐ 2	☐ 3
i	Walking <u>one hundred metres</u>	☐ 1	☐ 2	☐ 3
j	Bathing or dressing yourself	☐ 1	☐ 2	☐ 3

4. During the <u>past 4 weeks</u>, how much of the time have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Cut down on the <u>amount of time</u> you spent on work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b <u>Accomplished less</u> than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Were limited in the <u>kind</u> of work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d Had <u>difficulty</u> performing the the work or other activities (for example, it took extra effort)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. During the <u>past 4 weeks</u>, how much of the time have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Cut down on the <u>amount of time</u> you spent on work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b <u>Accomplished less</u> than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Did work or other activities <u>less carefully than usual</u>	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. During the <u>past 4 weeks</u>, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. How much <u>bodily</u> pain have you had during the <u>past 4 weeks</u>?

None	Very mild	Mild	Moderate	Severe	Very severe
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8. During the <u>past 4 weeks</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

9. These questions are about how you feel and how things have been with you <u>during the past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the <u>past 4 weeks</u>…

		All of the time	Most of the time	Some of the time	A little of the time	None of the time
		▼	▼	▼	▼	▼
a	Did you feel full of life?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b	Have you been very nervous?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c	Have you felt so down in the dumps that nothing could cheer you up?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d	Have you felt calm and peaceful?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e	Did you have a lot of energy?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f	Have you felt downhearted and depressed?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g	Did you feel worn out?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h	Have you been happy?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i	Did you feel tired?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

10. During the <u>past 4 weeks</u>, how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. How TRUE or FALSE is <u>each</u> of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a	I seem to get sick a little easier than other people	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b	I am as healthy as anybody I know	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c	I expect my health to get worse	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d	My health is excellent	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Thank you for completing these questions!

Short Physical Performance Battery (SPPB)

30s Chair stand & Hand grip tests

Walking Speed Test

The participant is to walk 4m at their normal pace (as if they were walking around town or in their home)

First walk test

Time (s): ☐

Second walk test

Time (s): ☐

Fastest Time (s): ☐

☐$_0$ The participant was unable to complete the walk

☐$_1$ If the time is more than 8.70 seconds

☐$_2$ If the time is more 6.21 to 8.70 seconds

☐$_3$ If the time is 4.82 to 6.20 seconds

☐$_4$ If the time is less than 4.82 seconds

Chair Stand Test

The participant is to fold their arms across their chest and perform FIVE rises from a chair to an upright position as quickly as possible

Time (s): ☐

☐$_0$ Participant unable to complete 5 chair stands or completes stands in > 60 seconds

☐$_1$ If chair stand time is > 16.70 seconds

☐$_2$ If chair stand time is 13.70 to 16.69 seconds

☐$_3$ If chair stand time is 11.20 to13.69 seconds

☐$_4$ If chair stand time is < 11.19 seconds

***Additional:** 30 second chair stand test – number of completed chair stands in 30 seconds

Test 1: ☐ **Test 2:** ☐

Balance Tests

Side by side stand (Feet together side by side)

☐ 1 Held for 10 seconds

☐ 0 Not held for 10 seconds

☐ 0 Not attempted

If 0 points, end Balance Tests

Semi-tandem stand (Heel of one foot against side of big toe of the other foot)

☐ 1 Held for 10 seconds

☐ 0 Not held for 10 seconds

☐ 0 Not attempted

If 0 points, end Balance Tests

Tandem stand (One foot in front of the other in a line)

☐ 2 Held for 10 seconds

☐ 1 Held for 3 to 9.99 seconds

☐ 0 Held for < 3 seconds

☐ 0 Not attempted

Total Balance Tests score ☐

Hand-grip Tests

Dominant hand ☐

Right hand: ☐ ☐ ☐ Left hand: ☐ ☐ ☐

The Six Minute Walk Test (6MWT)

Test 1

Start Time (hh:mm): ☐

Time (min)	Distance (laps)	Heart rate	Borg's scale	Rest (sec)
Rest	-		-	-
1				
2				
3				
4				
5				
6 (End)				

End time (hh:mm): ☐

Total distance (m): ☐

Recovery heart rate

1 minute post (bpm) : ☐

2 minute post (bpm): ☐

Completed Laps

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Test 2

Start Time (hh:mm): ☐

Time (min)	Distance (laps)	Heart rate	Borg's scale	Rest (sec)
Rest	-		-	-
1				
2				
3				
4				
5				
6 (End)				

End time (hh:mm): ☐

Total distance (m): ☐

Recovery heart rate

1 minute post (bpm) : ☐

2 minute post (bpm): ☐

Completed Laps

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

☐ 1 None ☐ 3 Shortness of breath ☐ 5 Hip pain

☐ 2 Chest pain ☐ 4 Knee pain ☐ 6 Back pain

☐ 7 Other: Please state ☐

Appendix C: Permissions

Permission to use the Health-Belief Model figure

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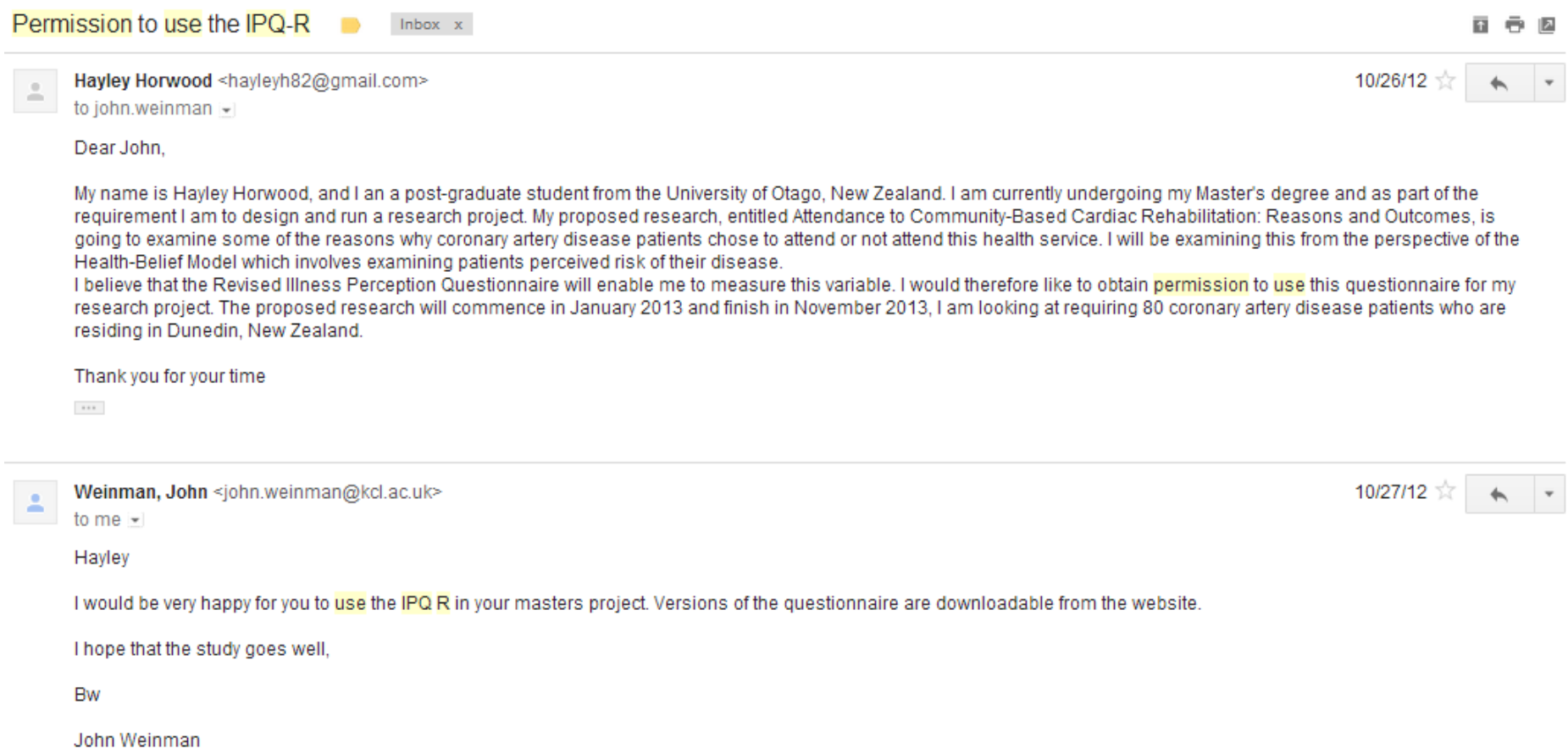


Permission to use the IPQ-R Inbox x

Hayley Horwood <hayleyh82@gmail.com> 10/26/12
to john.weinman

Dear John,

My name is Hayley Horwood, and I an a post-graduate student from the University of Otago, New Zealand. I am currently undergoing my Master's degree and as part of the requirement I am to design and run a research project. My proposed research, entitled Attendance to Community-Based Cardiac Rehabilitation: Reasons and Outcomes, is going to examine some of the reasons why coronary artery disease patients chose to attend or not attend this health service. I will be examining this from the perspective of the Health-Belief Model which involves examining patients perceived risk of their disease.
I believe that the Revised Illness Perception Questionnaire will enable me to measure this variable. I would therefore like to obtain permission to use this questionnaire for my research project. The proposed research will commence in January 2013 and finish in November 2013, I am looking at requiring 80 coronary artery disease patients who are residing in Dunedin, New Zealand.

Thank you for your time

Weinman, John <john.weinman@kcl.ac.uk> 10/27/12
to me

Hayley

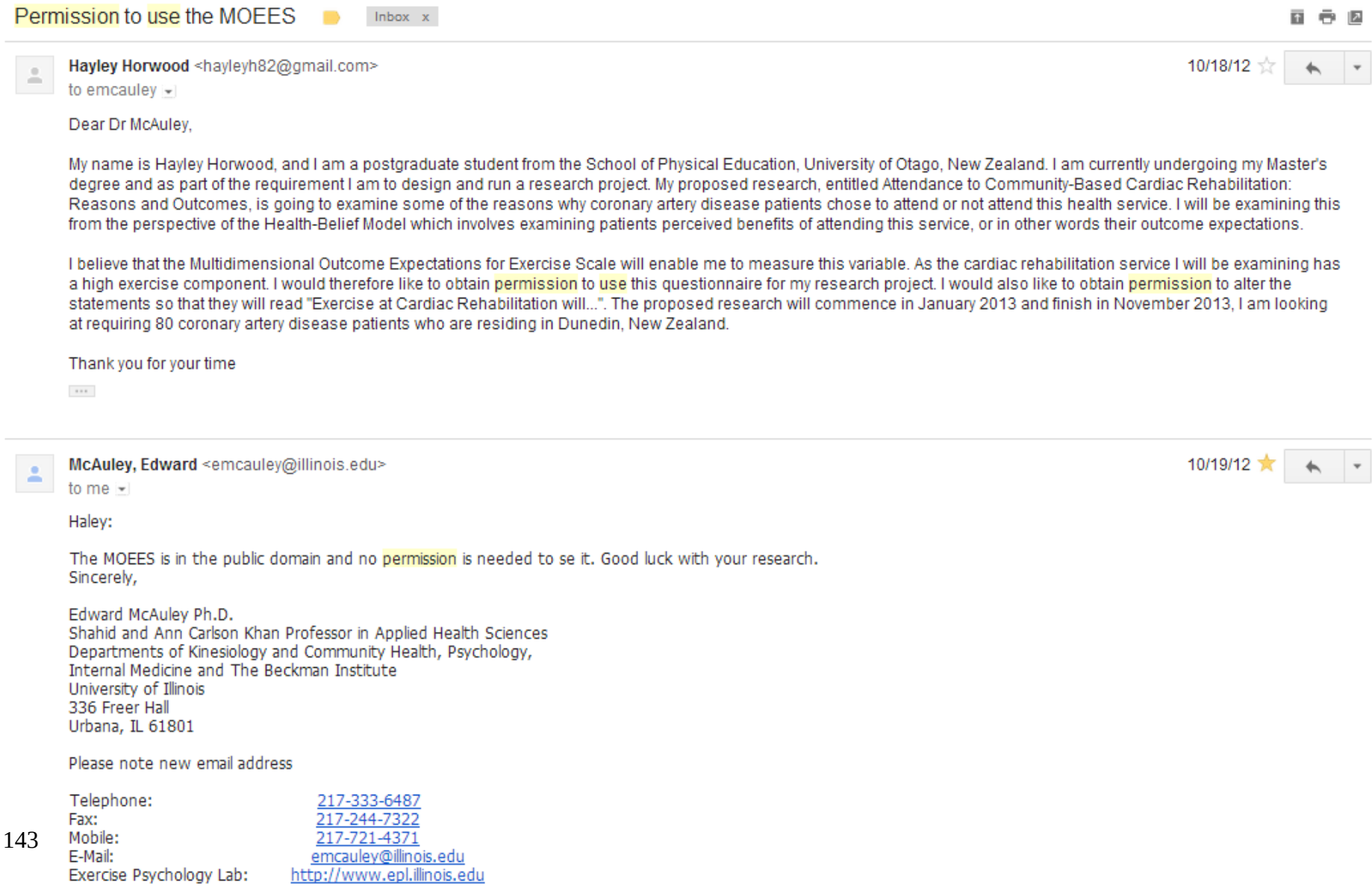
I would be very happy for you to use the IPQ R in your masters project. Versions of the questionnaire are downloadable from the website.

I hope that the study goes well,

Bw

John Weinman

Permission to use the Multi-dimensional Outcome Expectations for Exercise Scale (MOEES)



Permission to use the MOEES Inbox x

Hayley Horwood <hayleyh82@gmail.com> 10/18/12
to emcauley

Dear Dr McAuley,

My name is Hayley Horwood, and I am a postgraduate student from the School of Physical Education, University of Otago, New Zealand. I am currently undergoing my Master's degree and as part of the requirement I am to design and run a research project. My proposed research, entitled Attendance to Community-Based Cardiac Rehabilitation: Reasons and Outcomes, is going to examine some of the reasons why coronary artery disease patients chose to attend or not attend this health service. I will be examining this from the perspective of the Health-Belief Model which involves examining patients perceived benefits of attending this service, or in other words their outcome expectations.

I believe that the Multidimensional Outcome Expectations for Exercise Scale will enable me to measure this variable. As the cardiac rehabilitation service I will be examining has a high exercise component. I would therefore like to obtain permission to use this questionnaire for my research project. I would also like to obtain permission to alter the statements so that they will read "Exercise at Cardiac Rehabilitation will...". The proposed research will commence in January 2013 and finish in November 2013, I am looking at requiring 80 coronary artery disease patients who are residing in Dunedin, New Zealand.

Thank you for your time

McAuley, Edward <emcauley@illinois.edu> 10/19/12
to me

Haley:

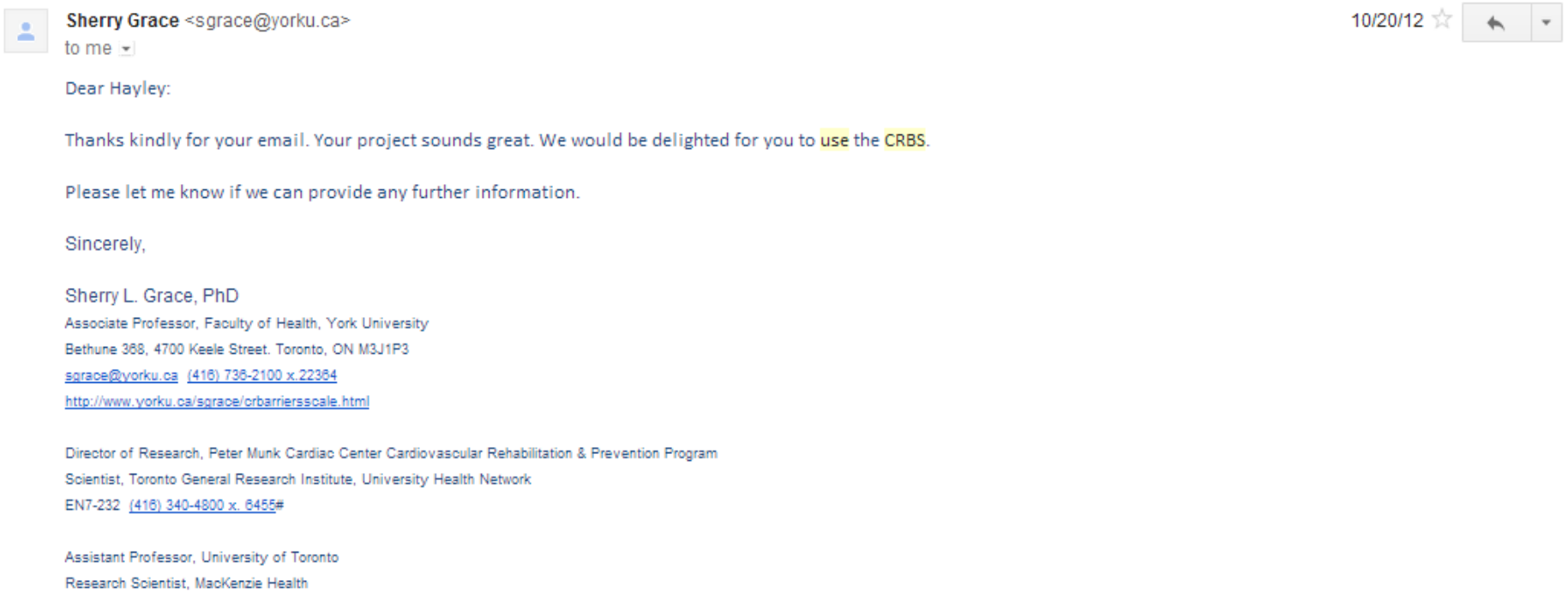
The MOEES is in the public domain and no permission is needed to se it. Good luck with your research.
Sincerely,

Edward McAuley Ph.D.
Shahid and Ann Carlson Khan Professor in Applied Health Sciences
Departments of Kinesiology and Community Health, Psychology,
Internal Medicine and The Beckman Institute
University of Illinois
336 Freer Hall
Urbana, IL 61801

Please note new email address

Telephone: 217-333-6487
Fax: 217-244-7322
Mobile: 217-721-4371
E-Mail: emcauley@illinois.edu
Exercise Psychology Lab: http://www.epl.illinois.edu

Permission to use the Cardiac Rehabilitation Barriers Scale (CRBS)



Sherry Grace <sgrace@yorku.ca> 10/20/12

to me

Dear Hayley:

Thanks kindly for your email. Your project sounds great. We would be delighted for you to use the CRBS.

Please let me know if we can provide any further information.

Sincerely,

Sherry L. Grace, PhD
Associate Professor, Faculty of Health, York University
Bethune 368, 4700 Keele Street. Toronto, ON M3J1P3
sgrace@yorku.ca (416) 736-2100 x.22364
http://www.yorku.ca/sgrace/crbarriersscale.html

Director of Research, Peter Munk Cardiac Center Cardiovascular Rehabilitation & Prevention Program
Scientist, Toronto General Research Institute, University Health Network
EN7-232 (416) 340-4800 x. 6455#

Assistant Professor, University of Toronto
Research Scientist, MacKenzie Health

****

LICENSURE AGREEMENT

I agree with the specification outlined above regarding the use of the **Cardiac Rehabilitation Barriers Scale (CRBS) and will abide with its requirements. I also agree to provide Dr. Sherry L. Grace a report at the end of this study detailing the results of this research investigation. The waiver of licensure agreement is in effect for the study duration as specified below.**

Licensee Information:

Name (please print):

Hayley Horwood

Full correspondence address:

Hayley Horwood
School of Physical Education
University of Otago
PO Box 56
Dunedin
New Zealand

Email address:

hayley.horwood@otago.ac.nz

Name of study:

Attendance to Community-Based Cardiac Rehabilitation: Reasons and Outcomes

Population and sample size:

Approximately 80 participants (this is the amount that will be aimed for in recruitment)

Expected study completion:

November 2013

Date: 18th October 2012

Signature: