ILLNESS PERCEPTIONS, CARDIAC REHABILITATION AND QUALITY OF LIFE IN CARDIAC SURGERY PATIENTS

A thesis submitted to The University of Manchester for the degree of
Doctor of Philosophy
In the Faculty of Medical and Human Sciences

2011

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CONTENTS

Word count: 79,066

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ABSTRACT

Background: Previous research indicates that for some individuals, quality of life (QoL) post-cardiac surgery (CABG or PTCA) declines from pre-surgery levels. Using the framework of Leventhal's Common-Sense Model, this longitudinal study examined the associations between patients' illness perceptions and coping strategies, their QoL, attendance at cardiac rehabilitation and lifestyle changes. It was hypothesised that a more negative profile of illness beliefs (weaker control beliefs, belief in more severe consequences, poorer understanding of the condition, and negative emotional representations) together with the use of more emotional coping strategies would be associated with poorer QoL. It was also hypothesised that attendance at cardiac rehabilitation would be associated with greater control beliefs, more severe consequences and a causal attribution of lifestyle.

Sample and Methods: 113 patients (93 male, mean age 66 (8.93) who were about to undergo cardiac surgery were recruited from two hospitals. Questionnaire measures of illness perceptions (IPQ-R), coping (CHIP) and cardiac-specific QoL (MacNew) were administered at four time points: pre-surgery, post-surgery, post cardiac rehabilitation, and one-year follow up. Data on attendance at rehabilitation and health behaviours were collected via hospital records and patient report.

Results: The best predictors of QoL were not cognitive representations of the cardiac problems, but negative emotional representations and associated emotion-focussed coping strategies, implying that an emotion-regulation intervention could be targeted to improve outcome. The predictive ability of initial QoL on QoL at later stages implies this might be best introduced pre-surgery. Having less severe consequence beliefs prior to surgery predicted greater attendance at cardiac rehabilitation. A better understanding of the cardiac condition predicted attendance at cardiac rehabilitation. There was no evidence of change in lifestyle post-rehabilitation.

Discussion: The findings that emotional representations of cardiac problems and the use of emotion focussed coping strategies were predictors of quality of life suggest that interventions to foster adaptive emotion regulation may improve outcome in these patients. Findings with respect to attendance at rehabilitation varied somewhat from the previous literature, possibly because the present study sampled patients who were having elective surgery, rather than those who had recently had a heart attack. The importance of studying defined populations and also the issue of when measures are obtained in relation to cardiac events were also highlighted.

DECLARATION

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LIST OF ABBREVIATIONS

CABG	Coronary Artery Bypass Graft surgery
CHD	Coronary Heart Disease
CHIP	Coping with Health Injuries and Problems scale
HRQoL	Health related quality of life
IP/ IPs	Illness perception/ illness perceptions
IPQ	Illness Perceptions Questionnaire
IPQ-R	Illness Perceptions Questionnaire – Revised
MI	Myocardial infarction
PTCA	Pecutaneous Transluminal Coronary Angioplasty
QoL	Quality of life
SF-36	Short Form – 36 measure

ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr Alison Wearden for her help and advice over the past years, taking on board my desire to try to explain the poor outcome for some cardiac surgery patients; also my academic advisors, Professor Dianne Parker and Dr Sarah Peters for their helpful advice. In addition, Dr Mark Jackson, Head of Clinical Governance at The Cardiothoracic Centre and John Kelly, former manager of the Countess of Chester Cardiac Rehabilitation service, who supported my ideas and helped turn them into a working proposal. In terms of actually recruiting patients and collecting data I would like to thank the invaluable support of Ruth Grainger from the Research and Audit department at The Cardiothoracic Centre, Sophie McIntosh from the Countess of Chester Cardiac Rehabilitation service, Jacqui Cliff from the Wrexham Cardiac Rehabilitation service, Mary Fisher-Morris of the Research and Clinical Audit department at the Countess of Chester, and the Consultants from all the hospitals involved who agreed to the research. Finally, I would like to thank all the patients who participated in this research.

Chapter 1: Introduction to the thesis and its aims

1.1 Introduction

The research to be described in this thesis will examine how cardiac patients' perceptions of their quality of life change after having coronary artery bypass grafting surgery (CABG) or percutaneous transluminal coronary angioplasty (PTCA) and attending a cardiac rehabilitation programme. The particular focus of the research is the relationship between patients' illness perceptions (IPs) and their quality of life (QoL) during this period, and in particular the role of their IPs prior to surgery. This first chapter will provide a brief overview of the study, and an outline of the structure of the material contained in the thesis.

1.2 Cardiovascular disease and coronary artery bypass surgery

Coronary heart disease (CHD) accounts for around 94,000 deaths each year and is the most common cause of premature death (death under the age of 75) in the UK (Allender et al., 2008). While death rates from CHD have been falling since the 1970's morbidity is not falling, and has actually risen in older age groups by approximately 25% since the late 1980's.

In CHD (to be described more fully in chapter 2), the coronary arteries become narrowed via a process known as atherosclerosis, which may lead to angina. While angina may be treated with medication, in more severe cases surgery is carried out to reduce symptoms, and to reduce the risk of cardiovascular events such as myocardial infarction (MI) (Luscher, 2000). There are two main cardiac surgery procedures: percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass grafting (CABG).

Traditional outcome measures for such surgery have encompassed simple survival rates, symptom rates, various indicators of physical and psychological morbidity, and social variables such as return to work. Such outcomes, while of use to clinicians, often correlate poorly with functional capacity and wellbeing, which may be of more interest to the patient (Guyatt, 1998). Recently, researchers have become interested in a broader set of outcomes, coming under the heading of QoL. QoL assesses whether life can be said to be worth living in social, psychological and physiological terms. It also provides a more subjective patient- led measure of outcome. The QoL construct will be reviewed in more detail in chapter 2 of this thesis.

1.3 Quality of life after cardiac surgery

In the field of cardiology, improving QoL is now seen as a major potential goal of both therapeutic and preventative treatments (Shephard & Franklin, 2001).
Research into the effect of CABG on QoL has shown that QoL generally improves after surgery (Anderson, Feleke & Perski, 1999; Lindsay, Hanlon, Smith & Wheatley, 2000). Undergoing cardiac rehabilitation after CABG has also been associated with significant additional improvement in QoL (Simchen, Naveh, Zitser-Gurevich, Brown & Galai, 2001).

However, research carried out in America has indicated that for some individuals, physical QoL is actually reduced after CABG (Rumsfeld et al, 2001). This research indicated that patients with relatively good physical health according to the Physical Component Summary (PCS) of the QoL measure the SF-36 before surgery were unlikely to have any improvement in their physical functioning, with approximately 25% of them actually showing a decline in these scores. Rumsfeld and colleagues suggested that these results indicated that such patients should not undergo CABG unless it was likely to improve their survival. Rumsfeld et al's study shows that self-reported physical quality of life may not be improved for all of those who undergo CABG, suggesting that psychological and environmental factors may also be important in determining QoL (Hart, Bowling, Ellis & Silman, 1990). The particular psychological factors which will be examined in relation to QoL in this thesis are related to Leventhal's Common-Sense Model (CSM).

1.4 Illness perceptions and coping

Leventhal, Meyer and Nerenz (1980) suggested that, when faced with a threat to their health, individuals develop two sets of representations of that threat, these being cognitive representations and emotional representations (also known as "illness perceptions" (IPs). Leventhal and colleagues incorporated these ideas into the CSM, which will be described in detail in chapter 3. Cognitive representations of the health threat are held to drive behaviours targeted at neutralising the threat, whereas emotional representations drive behaviours targeted at regulating emotions associated with threat. Importantly, cognitive and emotional representations, and the behaviours they drive are also held to interact with each other, so that an illness which is perceived as chronic, serious and uncontrollable is likely to engender more fear and anger than one that is seen as temporary or minor. IPs have been found to predict health related behaviours such as return to work and lifestyle change in patients recovering from a heart attack (Petrie, Weinman, Sharpe & Buckley, 1996), and have also been found to influence the decision to attend cardiac rehabilitation (Cooper et al, 1999; Whitmarsh, Koutantji & Sidell, 2003). Prior illness beliefs have also been found to predict post cardiac surgery health behaviours (Byrne, Walsh & Murphy, 2005; Gump, Matthews, Scheier, Schulz, Bridges & Magovern, 2001; Stafford, Jackson & Berk, 2008).

While Leventhal's model concerns itself with behaviours generated specifically to deal with threats to the health or threats to one's emotional well-being, there is a parallel literature on coping more generally in the context of illness. It is known that those with long-term conditions, such as cardiac problems, use different coping strategies to those with acute illnesses (Endler, Kocovski & Macrodimitris, 2001). Avoidant coping strategies, such as denial, venting of emotions, and mental and behavioural disengagement have been found to predict poor or non-attendance at a cardiac rehabilitation programme (Whitmarsh, Koutantji & Sidell, 2003).

1.5 Contribution to knowledge and aims of the research

Previous research in this field, to be reviewed in chapters 3 and 4, has examined the effect of CABG and attendance at cardiac rehabilitation on QoL, (Anderson et al, 1999; Herlitz et al, 1998; Lindsay et al, 2000), the effect of illness beliefs on post operative health behaviours (Byrne et al, 2005; Gump et al, 2001; Stafford et al, 2008), and whether such beliefs influenced attendance at cardiac rehabilitation (Cooper et al, 1999; Whitmarsh et al, 2003; Yohannes, Yalfani, Doherty & Bundy, 2007). At the time of starting the work described in this thesis (January 2003), there had been no previous, longitudinal research relating all of these variables in one study. The present thesis will examine IPs as predictors of QoL post cardiac surgery, and will also look at how IPs drive behaviours (such as attendance at cardiac rehabilitation and life-style change) post surgery. Additionally, it will examine the impact of emotional representations on coping strategies to regulate emotions.

1.6 Structure of the thesis

The information contained in this chapter has introduced the rationale for the proposed research. It has also provided basic information on three broad areas: cardiovascular disease and cardiac surgery; QoL; and IPs and coping. Chapter 2 contains more detailed background information about coronary heart disease, and a consideration of quality of life as an outcome. Chapter 3 provides a fuller introduction to illness perceptions, a description of the history of the Common-Sense Model, and a general review of studies of illness perceptions in cardiac conditions. Chapter 4 reports the findings of two systematic reviews of the literature which is directly relevant to the present research, and addresses two questions: firstly, whether IPs predict QoL after cardiac surgery, and secondly, whether IPs predict attendance at cardiac rehabilitation or lifestyle change after cardiac surgery. Chapter 5 draws on the material in chapters 2-4 to define the precise research questions to be addressed. Chapter 6 outlines the intended methods for the present research. Chapters 7-12 report the results of the present research, and include a preliminary interpretation of findings within each chapter. Chapter 7 is an introduction to and overview of the results section. Chapter 8 describes the sample. Chapter 9 examines the changes in IPs, use of coping strategies and QoL over the four time points independently of each other. Chapter 10 looks in depth at the predictive abilities of pre- and post-surgery IPs and coping at predicting QoL in the longer term; chapter 11 looks cross-sectionally at the associations between these IPs, coping and QoL at each of four time points – pre-surgery, post-surgery, post-rehabilitation, and at one year post-surgery. Chapter 12, the final results chapter, details associations between IPs, coping, and attending cardiac rehabilitation and making lifestyle changes. The final chapter, chapter 13, provides a general discussion of all the findings and evaluates how they address the hypotheses put forward in chapter 5, and how they relate to knowledge from the wider research field.

Chapter 2: Cardiovascular disease, CABG, quality of life, and cardiac rehabilitation

2.1 Introduction

Cardiovascular disease (CVD) is the main cause of death in the United Kingdom (Allender et al., 2008). This chapter provides basic information on coronary heart disease (CHD), including detail on the prevalence and possible causes of such diseases, with a particular focus on angina. There will then be a description of the current medical treatments for angina, focusing particularly on cardiac artery bypass graft surgery (CABG) and percutaneous transluminal coronary angioplasty (PCTA), and the effectiveness of the various interventions available will be reviewed, both medically and in terms of quality of life (QoL) changes. This chapter will finish with a description of cardiac rehabilitation as it is currently practised in the UK, and the relationship attending rehabilitation has with QoL.

Before starting to look at the prevalence of CHD, it is important to define what is meant by CHD.CHD is a chronic disease. It involves the narrowing or blockage of the arteries that supply the heart with oxygenated blood, a process known as atherosclerosis, the development and causes of which are reviewed below in section 2.3. Narrowing of the arteries may be partial, or there may be an almost complete blockage of the artery. This results in the restriction of blood flow. Total or partial restriction of blood supply to an organ (in this case, the heart) is termed ischemia. Temporary restriction of blood flow may cause the individual to experience a feeling of pain, heaviness or tightness in the chest, though pain may also be felt elsewhere in the body in some cases, or there may be no pain at all. Temporary chest pain, which is due to narrowing of the coronary arteries is referred to as angina (Swanton, 1994).

Stable angina is triggered by some physical exertion, and is relieved with rest. *Unstable angina* refers to angina attacks that are becoming more severe and more frequent, even occurring when the individual is resting. Unstable angina may precede the other main consequence of CHD, myocardial infarction (MI, commonly known as a heart attack). An MI occurs when the supply of blood to the heart is interrupted completely, rather than only temporarily or partially restricted. This complete interruption of the blood supply leads to the death of heart tissue, causing permanent damage to the heart, unlike angina which generally causes no permanent damage. The prevalence of these disorders will now be examined.

2.2 Prevalence of CHD and angina in the United Kingdom

CHD is the most common cause of death overall in the UK (approximately 94,000 deaths in 2006). It accounted for 1 in 5 of all UK deaths in men and 1 in 7 in women (Kressin et al., 2007). CHD is also the most common cause of premature death (death before the age of 75) in the UK, with a little under 31,000 deaths in 2001 (19% of all premature deaths in men, and 10% in women). Age stratified deaths due to CHD are shown in table 2.1.

Table 2.1 Deaths due to CHD by sex and age in the United Kingdom in 2005

Gender	**< 35**	**35-44**	**45-54**	**55-64**	**65-74**	**>75**	**All ages**
Men	114	834	2809	6802	11885	30141	52585
Women	34	185	588	1883	5494	33612	41796
Total	**148**	**1019**	**3397**	**8685**	**17379**	**63753**	**94381**

(Adapted from Allender et al. 2008, table 1.2 page 20).

As can be seen from table 2.1 above, the incidence of deaths from heart disease for men and women increased with age, with the greatest increase after the age of 75. Below the age of 75 the figures were consistently higher in males, but this situation was reversed after this milestone was reached, possibly due to females' generally greater life expectancy. While CHD is currently the most common cause of death in the UK, death rates have declined consistently since the early 1970's. Recently, this decline has been more pronounced in older individuals for both genders (Allender et al., 2008).

An estimated 87,000 men and 59,000 women suffer an MI each year in the UK (Allender et al., 2008). The rates for being diagnosed with angina are lower, with an estimated 52,000 men and 43,000 women (giving approximately 96,000 individuals overall) being diagnosed in 2006. There are, however, many more individuals who have previously suffered an MI or already diagnosed with angina. The latest estimates are that 970,000 men and 439,000 women in the UK over the age of 35 (a total of 1.4 million) have had at least one MI, with the numbers diagnosed with angina being even higher: 1.132 million men, 849,000 women and 1.98 million overall (Allender et al., 2008); for all these figures prevalence increases with age. The possible causes of CHD will now be considered.

2.3 Causes of CHD

In addition to the age- and gender-related prevalence effects noted in the previous section, CHD morbidity rates also differ by area and socioeconomic status, indicating that there may be a number of factors that influence the development of CHD. The proposition that there are multiple causes of CHD is supported by a large amount of research, with no one factor being sufficient on its own to cause the disease (Kannel, 1995).

In simple terms the underlying physical manifestations of CHD are atherosclerosis and arteriosclerosis (Straub, 2002). Atherosclerosis occurs when fats, in particular cholesterol, are deposited on the inner walls of the coronary arteries, thus causing the walls to thicken and reducing the circulation to the heart tissue supplied by that artery. Arteriosclerosis occurs when the blood vessels lose their elasticity; it is sometimes referred to as ‘hardening of the arteries’. This hardening of the arteries makes it more difficult for them to expand and contract to force the blood along the artery. As with atherosclerosis, arteriosclerosis also reduces blood flow to the heart, and additionally increases the likelihood of a blood clot forming and blocking the artery. Atherosclerosis and arteriosclerosis do not necessarily occur together, with atherosclerosis occurring to some extent in most western individuals from childhood (Clark, 1992), while arteriosclerosis is predominantly a problem linked with age. The affected individual may not suffer any symptoms for years, but as the blood vessels supplying the heart narrow over time they restrict blood flow. When the artery is narrowed by more than 50%, reduced blood flow during physical exertion may lead the individual to experience angina (Grech, 2003a).The greater the blockage, the more likely the individual is to experience unstable angina and MI, with MI usually involving the complete occlusion of the artery. While this basic physical explanation describes the immediate cause of angina and MI it does not clarify why the atherosclerosis and arteriosclerosis, which occur in all individuals, develop in some people to such an extent that there is a risk of CHD.

A number of possible risk factors implicated in the development of CHD have been investigated. The first two factors to be discussed are age and gender. As life expectancy has improved, leading to a greater proportion of the population being elderly (over 75 years), the prevalence of CHD has increased (Pierard, 2001; Rickenbacher & Pfisterer, 2002). However, this may be simply due to an increased length of time for the atherosclerosis to occur.

As can be seen in the prevalence data detailed earlier (Allender et al., 2008; Kressin et al., 2007) the level of mortality due to CHD is lower in women until they reach the age of 75 where the situation is reversed. It has been suggested that the increasing risk of CHD in women in later life is due hormonal changes at the menopause, as female reproductive hormones act as a buffer against the development of the disease (Drake, Broadhurst, & Dymond, 1997). Early studies supported this theory by reporting that the use of hormone replacement therapy (HRT) reduced the incidence of CHD in women (Grodstein & Stampfer, 1995; Hu et al., 2000; Walsh, Brown, Rubin, Kagawa, & Grady, 1997). However, a more recent prospective survey in Denmark found contradictory results (Lokkegaard et al., 2003). They followed 19,898 nurses from 1993 to 1998. At the initial stage the nurses filled in questionnaires asking them about their lifestyle and use of HRT. At the end of the study period information was gathered on incidence of ischemic heart disease using a combination of hospital admission and mortality data. These data indicated that using HRT at baseline had no protective effect on the development of the disease. However, while the morbidity and mortality data covered a wide range of CHD including MI and angina, they did not identify those women who may have had angina or other CHD who were treated only in primary care. A recent review (Tan, Gast & der Schouw, 2009), concluded that while the initiation of HRT near to the onset of menopause rather than some time after onset appeared to offer a reduction in the risk of developing CHD, this was not supported by prospective studies as yet, and that other preventative medication such as statins and aspirin might be more beneficial. This is supported by an American study that found that the increased risk of CHD in the year of the final menstrual period appeared to be explained by an increase in LDL cholesterol in this period, reinforcing the role of other protective medications than HRT (Matthews et al., 2009).

The role of genetic factors in the development of CHD has been known for many years (Neufeld & Goldbourt, 1983). There are inherited differences in susceptibility to CHD itself (Friedlander et al., 2001), as well as associated risk factors such as blood cholesterol levels, blood pressure and diabetes (Taira et al., 2002). Ethnic differences in rates of CHD have been noted, although these are often attributed to cultural lifestyle factors rather than genetic differences (Bonow, Smaha, Smith Jr., Mensah, & Lenfant, 2002).

The accepted medical and life-style related risk factors for the development of CHD are obesity and diabetes, smoking and other forms of tobacco consumption, and physical inactivity (Bonow, Smaha, Smith Jr., Mensah, & Lenfant, 2002; Hofer, Benzer, Schubbler, von Steinbuchel, & Oldridge, 2003). The risk of developing CHD is also directly related to levels of blood cholesterol, and in particular to the ratios between total cholesterol and HDL cholesterol and between LDL and HDL cholesterol (Niemeijer-Kanters et al., 2001). The WHO estimates that 1 billion of the world population is overweight or obese, (WHO, 2002). Obesity is partly due to the reduction in consumption of fruits, vegetables and whole grains and the rise in a more ‘westernised’ diet, which are high in fats, sugars and refined carbohydrates and hence, more calorie dense.

Where on the body the excess fat is stored can play a role in risk for CVD. Research on post-menopausal women in Denmark found that central fat mass (CFM, fat found in the trunk area) was associated with greater aortic calcification at a 6 to 7 year follow up than peripheral fat mass (PFM, fat found in the leg and arm areas). The baseline CFM measure was also significantly positively correlated with a range of cardiovascular risk factors (systolic and diastolic blood pressure and heart rate), but not cholesterol levels, while baseline PFM was significantly negatively correlated with systolic blood pressure (Tanko, Bagger, Alexandersen, Larsen, & Christiansen, 2003). An increase in body fat is also associated with thickening of the walls of the heart, which is related to increased cardiovascular risk (Karason, Sjostrom, Wallentin, & Peltonen, 2003). Obesity is also linked to the decline in physical activity (Kannel, 1995).

Approximately 36% of male deaths due to CHD in the UK, and 38% of female deaths, are estimated to be related to insufficient physical activity, with the overall death rate predicted to fall by 9% if less active people increased their level of activity to a moderate level (National Heart Forum, 2002). While the WHO believes these figures are too high, as they believe that other causes such as poor diet and genetic factors also play a role, they do agree that physical inactivity is a risk factor for CHD (WHO, 2002). Increasing physical activity in addition to making dietary changes is known to reduce low-density lipoprotein (LDL) blood cholesterol levels, while raising high-density lipoprotein (HDL) levels (Kressin et al., 2007).

Another lifestyle factor that is associated with the risk of developing CHD is tobacco consumption. It is estimated that 20% of male deaths and 17% of female deaths from CHD can be attributed to smoking (National Heart Forum, 2002). Both active and passive smoking have been linked to the development of CVD (Glantz & Parmley, 1995, , 1996; Milei & Grana, 1998). While the exact way in which cigarette smoke causes atherosclerosis is not yet known a popular view is that the oxidants and free radicals found in the smoke is absorbed into the circulation and promotes atherosclerosis by promoting levels of low density lipoprotein cholesterol. Support for this has been found in research on rabbits (Yamaguchi, Matsuno, Kagota, Haginaka, & Kunitomo, 2001), mice (Gairola, Drawdy, Block, & Daugherty, 2001) and, more importantly, in human passive smokers (Valkonen & Kuusi, 1998).

The final risk factor detailed by Bonow et al (2002) is diabetes. There is an overlap here with the areas of obesity and physical inactivity, as obesity is a major risk factor for Type 2 diabetes (Hofer, Benzer, Schubbler, von Steinbuchel, & Oldridge, 2003). Type 2 diabetes affects large numbers of the world population, with 150 million people currently affected, with this figure expected to double in the next 25 years (King, Aubert, & Herman, 1998). The link between diabetes and CHD has been known for many years (Betteridge, 1989; Jarrett, 1984). Diabetes is now known to double the risk of developing CHD (Zenk et al., 2005). It is a greater risk factor for women than men, so that there is no gender gap in CHD morbidity and mortality for male and female patients with diabetes (Pelfrene et al., 2003). However, when any prior history of CVD is looked at in comparison to diabetes, there are gender differences in the relative risk of cardiovascular events, with female patients with diabetes having a similar risk to non-diabetic females with a history of CVD, while a prior history was a greater risk factor than being diabetic for males (Benkert et al., 1997). This implies that diabetes confers greater additional risk for females than for males.

Moving on from the risk factors outlined by Bonow et al (2002), it has been known for some time that socioeconomic deprivation is associated with higher levels of CHD and greater mortality from the disease (Curtis, Eames, & Ben-Shlomo, 1993; Payne & Saul, 1997). Part of the increased prevalence of CHD in lower socioeconomic groups may be associated with the other risk factors (higher levels of obesity, smoking and physical inactivity) already detailed. For example, a lack of available income may lead to a poorer diet and less opportunity to take part in organised physical activities. However, there is evidence for an increased risk of CHD associated with lower socioeconomic status over and above that risk which can be attributed to smoking, activity levels, cholesterol profiles and hypertension (Steptoe et al., 2010).

The final risk factor to be examined is the role of wider psychosocial factors, and distress. A systematic review found that hostility, anxiety and depression, a lack of social support, and psychosocial ‘job strain’ were all associated with the development of CHD in initially healthy populations (Hemingway & Marmot, 1999). The link was particularly robust for anxiety and depression, with all the studies reviewed finding an association between these psychological states and the development of CHD. Psychological factors can also play a role in prognosis for those who already have CHD. For example, depression is linked to poor outcome for those with established CHD (Hemingway & Marmot, 1999; Lesperance & Frasure-Smith, 2000; Nemeroff, Musselman, & Evans, 1998; Stein et al., 2000); as is less effective social support, with all the studies reviewed by Hemmingway and Marmot finding a link (Hemingway & Marmot, 1999). However, it should be noted that where studies use self-report methods, the association between the reporting of perceived stress and the reporting of cardiac symptoms needs to be taken into account (Macleod, Smith, Metcalfe, & Hart, 2005), as this confound may inflate the correlations between measures of distress and symptoms.

So far this chapter has looked at the prevalence of CHD and possible contributing factors to its development. The focus now switches to the management of this disease. As this thesis is concerned with particular surgical interventions (CABG and PTCA), which are often used as an intervention for stable angina, the treatment section will focus on interventions for angina.

2.4 Treatment options for angina

Before angina is treated, it is useful to be able to describe the severity of the condition. One of the most commonly used classification systems for angina is that of the Canadian Cardiovascular Society which categorises patients on a 1 to 4 scale according to the degree of exertion that can be tolerated prior to symptoms being observed. A higher number denotes more severe angina (see Table 2.2).

Table 2.2 Canadian Cardiovascular Society classification of angina

Class I • No angina during ordinary physical activity such as walking or climbing stairs • Angina during strenuous, rapid, or prolonged exertion
Class II • Slight limitation of ordinary activity • Angina on walking or climbing stairs rapidly; walking uphill; walking or climbing stairs shortly after meals, in cold or wind, when under emotional stress, or only in the first few hours after waking • Angina on walking more than 100-200 metres on the level or climbing more than one flight of stairs at normal pace and in normal conditions
Class III • Marked limitation of ordinary physical activity • Angina on walking 100-200 metres on the level or climbing one flight of stairs at normal pace and in normal conditions
Class IV • Inability to carry out any physical activity without discomfort • Includes angina at rest

{Taken from (Grech, 2003b), page 1080}

However, this classification system does not allow for differentiation in terms of the pain and distress felt by the patients as it merely signifies the level of exertion that can be tolerated before any symptoms can be experienced. It also does not account for the frequency with which symptoms are experienced, which is known to be associated with greater levels of anxiety and depression (Arnold et al., 2009). In turn, such psychological issues are known to increase pain intensity and frequency, and decrease pain tolerance (Ashburn & Rice, 1998). In addition, early research found that reported chest pain was generally negatively correlated the degree of stenosis (Costa et al., 1985), indicating that there may be a mismatch between doctors ratings of the severity of angina and the consequences in terms of amount and frequency of pain felt by patients.

The condition of angina was first described in 1772 by Heberden (Grech, 2003b), although it was not until 1867 that the first effective drug treatment was available (Luscher, 2000). Current pharmaceutical interventions for angina are nitrates, beta blockers (developed in the 1960s) and calcium antagonists (1970s). While these drugs will all treat the symptoms of angina the patient may also be prescribed anti-platelet drugs (for example, aspirin), lipid-lowering drugs (known as statins) or beta blockers to reduce the chances of them suffering an MI (Petticrew, Turner-Boutle, & Sheldon, 1997)(Yusuf, Peto, Lewis, Collins, & Sleight, 1985).

Invasive surgical treatments for angina are primarily aimed at opening up the affected arteries to prevent a cardiac event (e.g. an MI) in the future, although they can also relieve symptoms of angina such as pain on exertion. CABG was first introduced in 1968, and PTCA in 1977 (Grech, 2003c). CABG involves grafting a replacement artery to bypass a narrowed or blocked section of the patient's artery. In general, the patient's circulation and blood supply to the brain is maintained by the use of a cardiopulmonary bypass machine. The operative mortality for CABG is in the 1-3% range, though it may be higher for more high risk groups such as those over the age of 80 (Cane et al., 1995; Shapira, Pines, & Mohr, 2001). Since the 1970s, revisions to the procedure have included using arterial rather than venous grafts (as arterial grafts last longer), carrying out the surgery without using a bypass machine (commonly termed 'off-pump'), and minimal access surgery (O'Toole & Grech, 2003).

The PTCA procedure does not involve such major surgery, the patient is only sedated using local anaesthetic and the chest is not opened. Instead a catheter is fed through the body's blood system, usually from an opening made in the arm or groin, until it reaches the affected blood vessel. In the earliest surgeries a balloon was then fed into the affected artery, and inflated, to reduce the blockage (Grech, 2003c). Since the 1970s the equipment used has become slimmer, and the balloons used can be inflated to a higher pressure, which aids the opening up of the affected area. However, there are two major limitations to this procedure. Firstly, due to vessel wall trauma, the blood vessel may become blocked again shortly after surgery (usually within the first 24 hours), this is known as acute vessel closure. This happens in approximately 3-5% of cases and can lead to MI, the need for emergency CABG, or even death. The second limitation to the PTCA procedure is restenosis, where the artery will slowly narrow again in the six months following surgery. This may mean that the angina symptoms and ischemia will return.

In order to tackle the problems of acute vessel closure and restenosis two main developments were made in the 1980s. The first of these was the use of drills, cutters or lasers to remove the material blocking the affected vessel, rather than just compressing it using a balloon (Grech, 2003c). While this tackled the problem of acute vessel closure, it did not significantly reduce the chance of restenosis. A second development, introduced in 1986, did however deal with this problem; this was the use of intracoronary stents. In simple terms these are very small metal ‘tubes’ of stainless steel alloys that hold open the walls of the affected vessel after it has been widened. There is a risk of a thrombosis within the stent, leading to an MI, but this can be avoided by the short term use of antiplatelet drugs. The very latest stents even emit the drugs themselves, these are known as drug eluting or ‘coated’ stents. These stents are believed to have reduced restenosis rates by 50% (Stone et al., 2004).

There are, as yet, no national guidelines for the management of angina in England. However, in Scotland the SIGN group (Scottish Intercollegiate Guidelines Network, 1998, 2001, 2007), have made recommendations for both primary and secondary care. Once the diagnosis of angina has been made usual treatment would be a combination of risk factor management and drug therapy. The risk factor management component of the therapy would involve recommendations to stop smoking, modify the diet, increase aerobic exercise levels, lose weight, reduce alcohol consumption to recommended levels, manage hypertension, and deal with elevated cholesterol levels, as appropriate to the individual. This is usually seen as the responsibility of primary care workers (Scottish Intercollegiate Guidelines Network, 2007). As detailed earlier in this chapter there is a range of drugs that might be prescribed.

While drug treatments may alleviate the symptoms the patient experiences and possibly prevent the worsening of the condition, drug treatment cannot reverse the coronary stenosis. In addition, such treatments do not always completely relieve symptoms for all patients (Luscher, 2000). For this reason, and also to assess the level of stenosis, such patients are referred on to secondary care for further assessment. This further assessment generally involves coronary angiography. This procedure is the “only absolute way to evaluate coronary artery disease” (Grech, 2003a). The procedure is generally carried out on a day case basis, together with cardiac catheterisation, which involves the haemodynamic measurements of aortic and ventricular pressures. This combination of evaluations allows a detailed assessment of the individual’s cardiac problems to be made. Angiography involves the insertion of a cardiac catheter through a femoral, brachial or radial artery, which is then slowly fed through to the coronary artery under investigation. The procedure is carried out under a local anaesthetic. Once the catheter is in place 30-40 millilitres of contrast medium are injected from the end of the catheter into the artery under investigation. This takes place over 3-5 seconds, so 2 to 4 contractions of the left ventricle can be seen using moving x-ray images. The information gathered during this procedure can then be used to assess the need for revascularisation procedures (PTCA or CABG).

In general, these procedures are recommended for those with either: left main stem disease with more than 50% stenosis; proximal 3 vessel disease; or 2 vessel disease involving proximal left anterior descending artery. For those with no need for immediate surgery (that is elective surgery within the next few months) there is an element in personal choice in deciding whether to undergo a PTCA or CABG procedure. However, there are other factors that might affect access to such treatments, such as the beliefs doctors hold about their patients; research has found that a patient’s lifestyle factors, such as their age or whether they smoke, can affect doctors views on the effectiveness of revascularisation (Bond et al., 2003; Fowkes et al., 1998). This belief is supported by other UK research in primary care, which has found that patients with angina are often reluctant to approach their general practitioner for help or secondary intervention from cardiologists (Gardner & Chapple, 1999; Tod, Read, Lacey, & Abbott, 2001). They attributed some of this reluctance to the patients’ belief that angina is a chronic disease, and a lack of knowledge about new developments in angina treatment. The next section moves on from looking at treatment options and their uptake to look at what happens once treatment has been received.

2.5 Treatment outcomes

This section will provide a brief outline of the medical outcomes of cardiac surgery, followed by the effects of such surgery on QoL.

2.5.1 Medical outcomes of cardiac surgery

A review of the efficacy and cost effectiveness of various treatments was carried out by the NHS Research and Development Health Technology Assessment programme (Sculpher et al., 1998). The review concluded that CABG leads to longer life expectancies, particularly for those whose disease is more severe (that is, multi-vessel rather than single vessel disease). Sculpher and colleagues found that this difference could be seen for up to 5 years post-surgery, and in some cases up to 10 years after CABG.

The introduction of PTCA has led to many comparisons of the two revascularisation techniques. No differences are seen between PTCA and CABG in mortality and non-fatal MI rates. CABG has been found to have less risk of further interventions and fewer angina symptoms than PTCA one year post-surgery; however, by 3 years after surgery any differences in the experience of angina symptoms was reduced (Sculpher et al., 1998). One study found that, while there were significant differences in angina-free rates between the two procedures at both 1 year and 5 years post-surgery, these differences had narrowed by the 5 year follow up point (Bypass Angioplasty Revascularisation Investigation Investigators, 1997). Overall, the risks of CABG and PTCA are low, with operative mortality rates of 1-3% and 0.2% respectively (O'Toole & Grech, 2003).

Psychological problems, such as anxiety and depression symptoms, prior to surgery have long been associated with a poor outcome after CABG (Pignay-Demaria, Lesperance, Demaria, Frasure-Smith, & Perrault, 2003), in particular an increase in cardiac events and higher mortality. A review of 14 interventions designed to improve psychological state prior to a range of procedures including cardiac catheterisation (Moline, 2000) found that the interventions successfully reduced anxiety felt by the patients before, during and after these procedures.

2.5.2 Quality of life outcomes after cardiac surgery

Improving a patient’s QoL is considered to be a key aim of therapeutic cardiac treatments such as CABG or cardiac rehabilitation (Shephard & Franklin, 2001). It has been suggested that patients’ current and future QoL should be considered when recommending such procedures, as in some cases patients QoL may suffer from undergoing such a procedure (Rumsfeld et al., 2001). QoL is, therefore, an important outcome measure in cardiac treatment that should be looked at in tandem with the medical benefits.

QoL is particularly an issue in chronic diseases, where it is frequently used to assess how an individual is coping with their ill health (Nicolson & Anderson, 2003). Of particular interest to the present research is the finding that QoL can also be used to predict which cardiac patients are at high risk of adverse outcomes (that is death or hospitalisation for a cardiac event such as MI, angina or stroke). An Australian study that used a cardiac specific measure of QoL (the MacNew) found that both global QoL and all three domains (social, physical and emotional) predicted mortality and morbidity in cardiac patients who had previously had an emergency hospital admission, this was independent of clinical and demographic factors (Dixon, Lim, & Heller, 2001).

A US study of 1145 patients’ QoL using the 8 domains of the SF-36 and the Seattle Angina Questionnaire (SAQ) at baseline, 6 and 12 months after PTCA (Seto et al., 2000) found substantial improvements in all domains of QoL at both 6 and 12 months after surgery. A study in Scotland, carried out between 1995 and 1997, examined changes in SF-36 scores in 183 patients from prior to surgery to 12 months post-surgery (Lindsay, Hanlon, Smith, & Wheatley, 2000). These researchers found significant improvements in all the 8 domains of the SF-36, with higher social network scores prior to surgery, and better pre-operative health, being associated with improved health status. They found that those with lower SF-36 scores prior to surgery were less likely to show improved scores after surgery. However, an American study that also used the SF-36 found the opposite; that is those with poor health status prior to surgery had better QoL after CABG, while those with good QoL before surgery were unlikely to have any improvement (Rumsfeld et al., 2001). These discrepant findings highlight the importance of assessing pre-surgery QoL and of the timing of post-surgery follow-ups. Those whose physical health is relatively good prior to surgery might find the after effects of surgery more traumatic than those in poorer pre-surgery health. A minimum of two to three months recovery time is suggested by the British Heart Foundation (British Heart Foundation, 2010), with many people feeling very tired for the first three to six months, and some not improving for up to 18 months after surgery. Thus, from having few physical symptoms from to their heart problems pre-surgery, some patients may quite reasonably feel that their physical health has declined due to the surgery, while those whose physical health is poor before surgery may see no decline or even an improvement in their physical health after surgery.

Further evidence that QoL in CABG patients may be affected by the timing of assessment comes from a small scale Australian study assessed QoL in 48 patients using the SF-36 pre-surgery and at 1 year and 2 year follow-up (Azzorpardi & Lee, 2009). The SF-36 has 8 domains which can be examined separately or combined to give composite Physical and Mental Component scores. Overall at 2 years there were significant improvements in the Physical Component Score (PCS) and 5 of the 8 domains, but not in bodily pain, general health perception, role limitations due to emotional factors and the composite Mental Component Score (MCS). However, when comparing the scores at 1 year and 2 year follow-ups the authors reported a moderate but non-significant decline in PCS and 6 of the 8 domains (physical functioning, role limitations physical, bodily pain, general health perception, vitality, role limitations emotional), with non-significant improvements only in the mental health and social functioning domains and MCS. A larger Australian study looked at 229 women admitted to hospital for CABG (n=126) or due to an MI (n=103) (Worcester et al., 2007). They were assessed using the SF-36 in hospital and 2, 4 and 12 months later. Recovery to age adjusted normative scores on the SF-36 was quickest for bodily pain and mental health (reached this level by 2 months), but was slowest for physical functioning, role limitations physical and role limitations emotional, which were still not at normative levels at 12 months follow up. Interestingly, CABG patients showed greater improvement in physical functioning, role limitations physical, bodily pain, vitality and social functioning than the MI patients, however they did have worse QoL scores at baseline and the surgery was designed to improve their situation.

There are also differences in changes in QoL depending on the type of surgery patients undergo. Lukkarinen and Hentinen (2006) assessed changes in QoL using the Nottingham Health Profile on 100 CABG patients, 100 PTCA patients and 80 patients with CAD who had been treated with medication alone over a period of 8 years (there was a drop out of around 40-50% in this time). They found that CABG patients showed significant improvements in mobility, energy levels and pain over this time. PTCA patients also demonstrated these improvements but also showed significant improvements in emotional reactions but significant impairment in sleep, and the medication group had no significant changes in QoL. Therefore, the two groups of surgical patients may differ in terms of outcome from each other as well as from other cardiac patients such as those who have suffered an MI.

Of relevance to the present work, a Greek study which followed up 157 CABG patients for 6 months after surgery using the MacNew (Panagopoulou, Montgomery & Benos, 2006) examined the influence of pre-operative physical and psychological status on post-operative QoL. Overall, the patients showed significant improvements in QoL at both 1 month and 6 months post-surgery time points. After controlling for baseline QoL, QoL at both follow up points was predicted by baseline psychological distress as measured by the Positive and Negative Affect Scale, but not by physical functioning pre-surgery. This implies that QoL may be more influenced by pre-surgery emotional functioning. However, the domain of QoL that is affected is unknown as Panagopoulou et al used only the overall MacNew QoL score rather than the individual domains (physical, social and emotional). Therefore, there is a need to explore further the influence of pre-surgery emotional states on QoL in the recovery period after surgery.

The measure chosen for the present research is the MacNew Quality of Life in heart disease questionnaire (Valenti, Lim, Heller, & Knapp, 1996). This measure is a revision of the earlier Quality of Life after Myocardial Infarction measure (QLMI, (Hillers et al., 1994). The MacNew was developed from the QLMI and has 27 items relating to three domains – physical (13-items), emotional (14-items) and social (13-items). There is also an additional

28th question designed to be used for patients who have undergone heart surgery, which asks them whether they would undergo the procedure again if they could go back in time. The measure is self-administered and designed to be completed in 5 to 10 minutes, leading to a response rate of over 90% (Hofer, Lim, Guyatt, & Oldridge, 2004). The MacNew has been found to be the most appropriate disease-specific measure to use with patients with ischaemic heart disease after a review of the psychometric evidence for nine such instruments (Dempster & Donnelly, 2000).

So far this chapter has looked at outcome linked only to the medical interventions. Another factor that may affect long-term outcome is undergoing cardiac rehabilitation. In the next section the purpose of rehabilitation, its effects on changing risk factors for future cardiovascular events, and then some alternatives to traditional rehabilitation programmes, will be examined.

2.6 Cardiac rehabilitation

While for many years cardiac rehabilitation was targeted on post-MI patients, with the publication of the national service framework for coronary heart disease (Department of Health, 2000), it is now expected that all patients admitted to hospital suffering from coronary heart disease should be invited to attend a multidisciplinary cardiac rehabilitation programme before they leave hospital. In addition, the Scottish (SIGN) guidelines currently state that all patients undergoing a PTCA or CABG should receive cardiac rehabilitation (2007).

The World Health Organisation in 1993 defined cardiac rehabilitation as the ‘sum of activity and interventions required to ensure that the best possible physical, mental, and social conditions so that patients with chronic or post-acute cardiovascular disease may, by their own efforts, preserve or resume their proper place in society and lead an active life’ (WHO, 1993). This definition demonstrates historical developments from the first, exercise-based programmes targeted at post-MI patients only, to more holistic interventions targeted at all CVD patients. In practice, even today there is still a strong emphasis on exercise, but education to reduce risk factors for CHD, such as smoking, and psychological interventions are now also commonly included in cardiac rehabilitation (SIGN, 2007).

In the UK, recent guidelines support the need for a multidisciplinary programme of rehabilitation, provided by appropriate health professionals, and recommend that the programme is tailored for an individual’s needs (Thompson, Bowman, Kitson, de Bono, &

Hopkins, 1996). However, in practice these guidelines are seldom adhered to and many programmes are heavily exercise based (Lewin, Ingleton, Newens & Thompson, 1998). One older study suggested that exercise alone has no significant effect on blood lipid levels or re-infarction or mortality rates, though it does improve physical aspects of recovery (Dinnes et al., 1998). Exercise based rehabilitation has on the other hand been shown to reduce depressive symptoms in women (Lavie, Milani, Cassidy, & Gilliland, 1999). It should be noted that, due to the lack of enforcement about what cardiac rehabilitation should consist of, for some surgical patients it may not even involve attendance at a rehabilitation programme but advice on exercise levels only.

The most effective form of rehabilitation is a combination of exercise, psychological and educational interventions (Dinnes et al., 1998). Such programmes have been shown to reduce blood lipid levels and blood pressure, and increase exercise levels in the short term (Jaagosild et al., 1998). However, it may be that such programmes are more effective for MI than for angina patients. Jolly et al (1999) conducted a randomised controlled trial which in which 65 patients newly diagnosed with angina of unspecified severity were randomised to a rehabilitation intervention and compared with 87 controls, followed up for one year. The rehabilitation intervention may be criticised as it did not involve attendance at a programme of supervised exercise, but relied heavily on practice nurses delivering periodic interventions to encourage behaviour change, based on the stages of change model. Not all the practice nurses in this study attended the necessary training, and, in fact, one participating practice did not even employ a practice nurse. Therefore, the actual content of the rehabilitation was not standardised.

Exercise based rehabilitation can have other positive effects. A Canadian rehabilitation programme for women post-MI, post CABG or PTCA or current angina patients, that consisted of 7 weeks of supervised exercise training, followed by 7 weeks of unsupervised exercise and lifestyle modification found that levels of HDL cholesterol, which protect against adverse cardiac events, were raised (Kennedy, Abbott, & Rosenberg, 2002). However, this change cannot be solely attributed to the exercise component of the programme as lifestyle advice including dietary advice was also given. A review of rehabilitation programmes in the elderly also found similar benefits for cholesterol levels after exercise interventions (Aronow, 2001), though again it is not clear if this improvement is due to the exercise component alone or other behavioural change aspects.

Such lifestyle change aspects of cardiac rehabilitation are important, as the reduction in risk factors such as smoking, weight control and blood lipid levels may reduce the risk of future adverse cardiac events such as MIs. A review found that behaviourally-orientated interventions could successfully reduce the incidence of such risk factors; however, less favourable results for smoking cessation were found for CABG patients than MI patients (Sebregts, Falger, & Bar, 2000).

Diet is frequently targeted as part of a cardiac rehabilitation programme. Effective weight loss and improvement in cholesterol levels have been found in non-specialised nurse-led interventions, that included dietary advice, combined with exercise (Savage, Lee, Harvey-Berino, Brochu, & Ades, 2002; Timlin, Shores, & Reicks, 2002). A randomised controlled trial in Northern Ireland provided personal health promotion to angina patients, delivered by a trained nurse every 4 months for 2 years. It led to improvements in diet at the end of the 2 year period (Cupples & McKnight, 1999); however by a 5 year follow up no differences in diet were found between the intervention and control groups. This suggests that, in order for such lifestyle changes to persist, health promotion would have to be on-going rather than time-limited.

Smoking cessation is one of the most important components of any rehabilitation programme, as it can have a major effect on reducing the risk of adverse cardiac events. An epidemiological study in Scotland, looking at the effect of cardiovascular treatment and risk factor changes on deaths from CHD over a 19 year period attributed 36% of the reduction in deaths to a drop in smoking rates in the general population (Capewell, Morrison, & McMurray, 1999), by far the greatest percentage reduction of any variable examined. The recent legislation to ban smoking in the workplace and in public places such as pubs and restaurants has led to a small but significant reduction in hospital admissions for MIs in England in the first 15 months of the ban (Sims, Maxwell, Bauld & Gilmore, 2010). How to deliver smoking cessation as part of a rehabilitation programme is unclear however. Single sessions of advice have been found to be no more effective than usual care (Hajek, Taylor, & Mills, 2002), with CABG patients again being less likely to give up than MI patients. However, angina patients whose disease is severe, and who have undergone CABG, are more likely to quit than angina patients whose disease is less severe, and who have not undergone this procedure (Bosworth et al., 1999). It should be noted, however, that smokers are less likely to attend rehabilitation than non-smokers (French, Lewin, Watson & Thompson, 2005).

2.6.1 The effects of cardiac rehabilitation on QoL

Cardiac rehabilitation is an important secondary prevention method in the field of cardiology, and boosting QoL is seen as an explicit goal of such programmes (McGee, Hevey, & Horgan, 1999; WHO, 1993). It has also been reported that undertaking regular exercise is associated with better QoL in the longer term after CABG, with Treat-Jacobson and Lindquist (2007) finding this to be the case as long as 5 to 6 years post-surgery, emphasising the need to promote long-term exercise behaviours.

Participation in cardiac rehabilitation programmes by CABG patients tends to be low – 24% in one American study (Pasquali, Alexander, Coombs, Lytle, & Peterson, 2003) – and associated with relatively high physical functioning prior to rehabilitation. This may be due to the fact that higher functioning patients have not always been targeted for rehabilitation in the past (Lewin, Ingleton, Newens, & Thompson, 1998), though this has changed in England due to the introduction of the National Service Framework that stated that all post-CABG patients should be invited to attend rehabilitation (Department of Health, 2000).

An Israeli study compared 124 patients who had undergone CABG and cardiac rehabilitation with 248 matched controls (matched for gender and age within 5 years) who had also had CABG in the same year, but who had not attended a cardiac rehabilitation programme after their surgery, using the SF-36 at 12 months post-surgery (Simchen, Naveh, Zitser-Gurevich, Brown, & Galai, 2001). The rehabilitation group scored significantly higher on the self-perception of general health, physical functioning and social functioning domains than the control group. Some of these improvements seem to endure over time. A 5 year follow-up of Finnish CABG patients who had undergone rehabilitation found that, while the level of symptoms, exercise capacity, and use of medication did not differ from a CABG control group, the rehabilitation group rated their health and life situation using single item self-report measures significantly better at 5-years post surgery than the control group (Engblom, Korpilahti, Hamalainen, Ronnemaa, & Puukka, 1997). This difference in health perception was also seen at 12 months post surgery, but was not statistically significant at this time (Engblom et al., 1992). These Finnish findings seem to indicate that subjective assessments of health are more likely to be affected by cardiac rehabilitation than objective outcomes such as medication use.

More recently, a randomised control trial was carried out in the Netherlands to compare a purely exercise based rehabilitation programme with one with the addition of psychosocial and relaxation education (Brugemann et al, 2007). 137 males who had undergone uncomplicated CABG or PTCA procedures were randomly allocated to either the usual 6 week exercise only programme (3 half hour sessions per week) or to this programme plus 8 weekly education sessions with a psychologist. Their QoL was assessed using the QLMI pre-rehabilitation, at the end of their programme and 3 months and 9 months later. By the 9 month follow up period there were 55 participants who had taken part in the exercise only programme and 49 who had received the additional programme. For both groups there were significant improvements in physical and social QoL at 9 months, but there was no improvement in emotional or overall QoL. For the emotional domain there was an immediate improvement at the end of the rehabilitation programme, but scores had then declined at the later time points. There were also no significant differences in QoL outcomes for the two rehabilitation programmes, possibly indicating that exercise is the most important part of rehabilitation for such programmes. However, it should be noted that this programme's content, which was based on Rational Emotive Therapy, appears to have only attempted to address psychological distress, rather than attempting to promote behavioural change as is the usual format in the UK. While such a psycho-educational programme may aid those suffering from psychological distress post-surgery the nature of the randomised control trial means that those undergoing the programme may not be those at need, which could explain their findings.

From the literature detailed in this chapter it is evident that QoL is an important outcome measure in cardiac patients, and can be used to assess changes due to both surgery and rehabilitation. The next chapter switches the focus of this review of the literature to an area that may influence outcome, that is, the individual's illness perceptions. Related to this, as part of the CSM, the coping strategies individuals use for emotional regulation which may also have a role to play in QoL will also be discussed in the following chapter.

Chapter 3: The role of illness perceptions in chronic illness

3.1 Introduction

While the previous chapter examined factors associated with quality of life (QoL) after cardiac operations and cardiac rehabilitation, this chapter is concerned with factors that might influence QoL over the course of treatment and the recovery period. The particular focus of this chapter is the role of patients' beliefs about their condition, and the strategies they use to cope with, manage, or otherwise deal with their illness, drawing on the framework of the Common-Sense Model (CSM) developed by Leventhal (Leventhal, Meyer, & Nerenz, 1980). The development and assessment of the CSM model will be detailed initially. This will be followed by an examination of the application of the model to cardiac illness, the impact of illness perceptions (IPs) on behaviour change and emotional regulation, and how IPs may change over time in those experiencing cardiac illnesses.

3.2 Illness perceptions

Whereas the Common-Sense Model initially used the terms "cognitive representations" or beliefs about illness, and "emotional representations" or emotional responses to illness, nowadays cognitive representations are more commonly called illness cognitions, and cognitive and emotional representations together are termed "illness perceptions". This discussion of IPs will cover three main areas. The first of these is the historical and theoretical development of the concept of IPs. This will be followed by a formal introduction to and discussion of Leventhal's CSM (also known as the self-regulatory model) and, finally, the measurement strategies developed from the model will be discussed.

3.2.1 The historical development of illness perceptions research

Leventhal's early ideas were influenced by work in the areas of attitude change (changing people's beliefs and behaviour) and persuasive communication (methods to change attitudes) for disease prevention, in particular the area of fear in behavioural regulation. Researchers at the time believed that, if a fear-inducing communication about a disease state was used to generate a sense of threat in the individual, he or she would develop a more favourable attitude to carrying out behaviours to avoid the disease, and would also be more likely to actually carry out such behaviours (Leventhal et al., 1997). This formulation developed from the revised theory of drive reduction (Dollard & Miller, 1950) which suggested that positive attitudes and behaviours would be reinforced by the fact that the individual's sense of vulnerability to the disease threat would no longer be present, leading to a reinforcing reduction in fear. If the individual's actions failed to remove the perceived fear and danger he or she felt, he or she might use denial and other inappropriate coping strategies in order to reduce the fear. However, the actual danger or threat to the health would be unaffected by the latter types of responses. In other words, while the danger might still be there, through denial or some other strategy, the individual might feel no fear about it affecting them. By contrasting high and low fear communications Leventhal and his colleagues found that, while high fear-generating messages caused more attitude change than low fear-generating messages, they did so independently of any reduction in fear caused by carrying out disease preventing activities, indicating dissociation between attitudes and emotions. In addition, the effect of fear generating messages on the individual's attitudes was short lived. Looking in particular at disease preventing activities, they found that, in general, no more behavioural changes were seen after a higher fear communication than a low fear message, indicating that while fear may have an emotional effect, this does not always lead to behaviour to address the health threat (Leventhal et al., 1997). This reinforced Leventhal's view that fear control and danger control are relatively independent of each other, hence the emotional response of the individual does not act as a drive stimulus for the danger response (Leventhal, 1970). Early field studies on patients undergoing endoscopies and female patients undergoing surgery demonstrated that fear and danger control are partially independent in real-life settings as well as in the laboratory experiments utilised by Leventhal to develop his theory (Johnson & Leventhal, 1974; Johnson, Leventhal & Dabbs, 1971).

In summary, by investigating the effect of health threats and fear appeals, Leventhal concluded that there was a parallel processing of such information, with fear messages leading to an emotional reaction, which needed to be dealt with (fear control), and cognitive representations which generated behavioural attempts to reduce the threats themselves, often by practicing a health protective behaviour (danger control) (Leventhal, Brissette, & Leventhal, 2003). Hence, while fear control strategies led to coping strategies to reduce fear, they did not alone lead to health-related changes in individuals' behaviour; the latter were, in fact, influenced by the danger control aspect, emphasising the role of individuals' cognitions or beliefs. This is illustrated figure 3.1 (taken from (Leventhal et al., 2003), page 46).

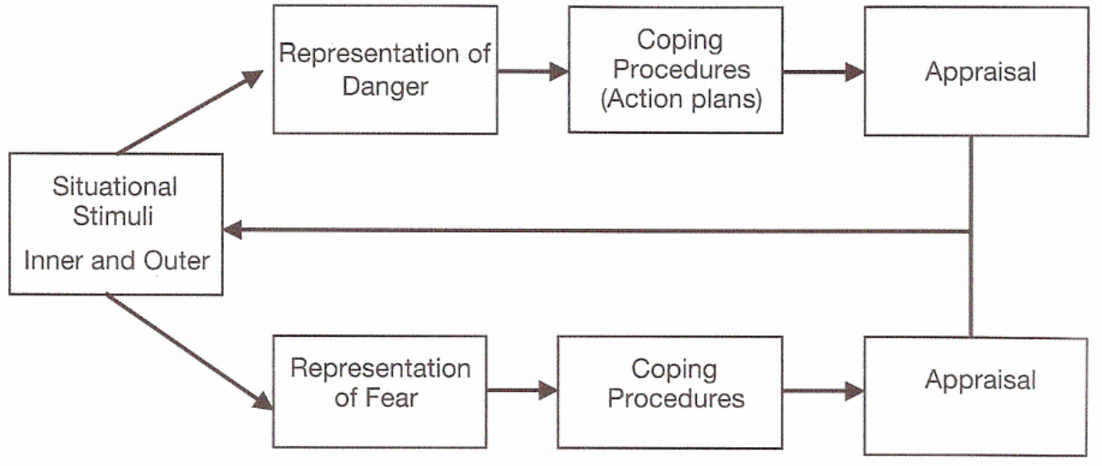


Figure 3.1: The parallel process model

Leventhal and colleagues subsequently widened their search for the cognitive determinants of health behaviours. In doing so, they drew on early research into the health belief model, observational studies of patients undergoing medical procedures and data on lay populations (Johnson & Leventhal, 1974; Leventhal et al., 2003). A common theme emerging from these disparate areas of research showed that patients developed their own perceptions or cognitive representations of any health threat they may be exposed to, and developed their own strategies to deal with these threats. These perceptions were often influenced by the patients' own experience of illness. This research led Leventhal and colleagues (1980) to conclude that patients' experiences affected how they perceived their illness, which in turn affected how they coped with their illness, and, hence, could predict outcomes such as recovery from MI, as illustrated by two systematic reviews of the CSM (Hagger & Orbell, 2003; Mondloch, Cole, & Frank, 2001).

Other investigators have also suggested cognitive models to explain individual variations in the perception and reaction to illness (Cioffi, 1991; Pennebaker, 1992). However, the particular feature of Leventhal's model is its parallel processing format, and the suggestion that individuals generate both cognitive and emotional representations when faced with a health threat. The CSM has also led to more research than other theories, especially since the development of specific measures to assess patients cognitive and emotional representations (Moss-Morris et al., 2002; Weinman, Petrie, Moss-Morris, & Horne, 1996).

3.2.2 Detail of the Common-Sense Model

Cognitive and emotional representations and their resultant coping strategies are conceptualised as attempts at self-regulation; hence the CSM is also referred to as the self-regulatory model. The model explains how individuals use their understanding and experience of illness to monitor how they manage it. This implies that his or her perception of the illness will change over time, so the self-regulatory process is a dynamic process; a change at any place in the model has the potential to affect other places in the model. As can be seen from the diagram below, while cognitive representations and emotional representations are held to be processed in parallel, they also have mutual influences on each other. To give an example, a person experiencing a headache may interpret it, using concrete and abstract evidence, as either a hangover or a migraine, and may decide to take hangover-appropriate or migraine-appropriate action to neutralise the threat. There will also be an emotional response (e.g. anger for the hangover, anxiety for the migraine) and the cognitive representations may influence the emotional representations (e.g. a person may feel regretful or guilty if the headache is thought to be a hangover, but not if it is thought to be a migraine). The emotional responses will drive their own emotion-regulation strategies, e.g. seeking support from others, employing distraction techniques, which occur in parallel with the attempts (drinking water, lying down) to regulate the threat itself. A basic outline of the model is shown below, illustrating its dynamic qualities.

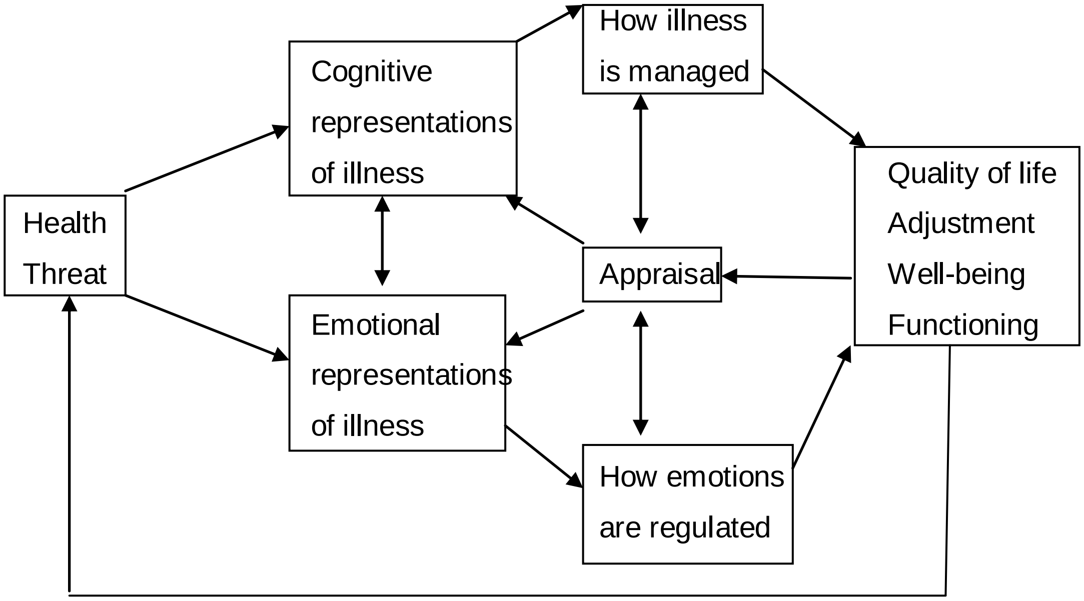
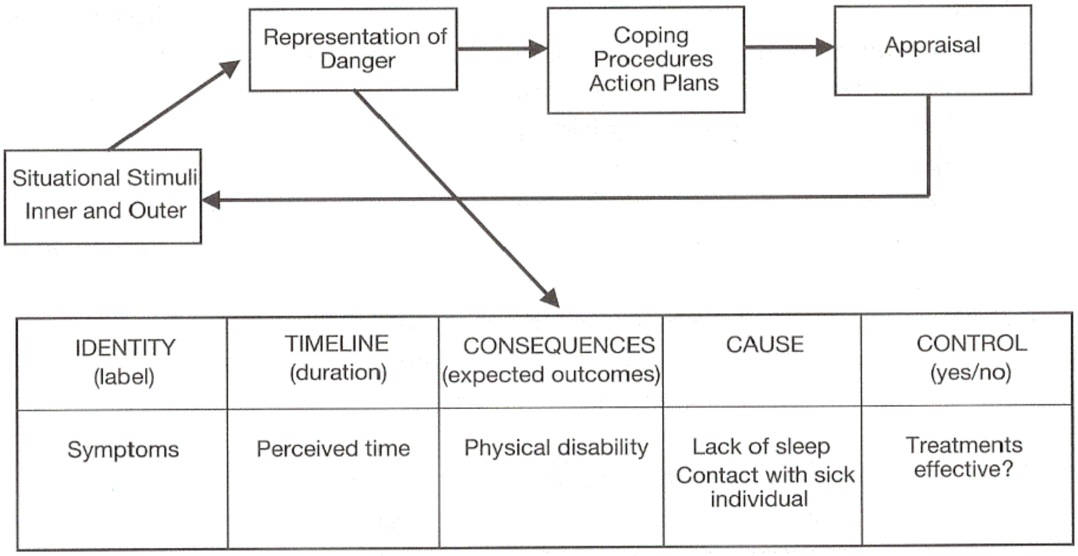


Figure 3.2: An illustration of the full Common-Sense Model

Although the model is dynamic, the primary focus of much research carried out to date has been into the nature of cognitive representations, and their impact on illness outcomes, often in cross-sectional designs. Cognitive representations are not only dependent on the individual’s direct experience of their illness (termed concrete experiences by Leventhal), but may be influenced by those around them (both medical professionals and family and friends), and by information from the media (termed abstract sources of information by Leventhal). Empirical research has found that these IPs routinely factor into five different components (Lau & Hartman, 1983; Petrie & Pennebaker, 2004). These are illustrated in figure 3.3 (taken from (Leventhal et al., 2003), page 50).



IDENTITY (label)	TIMELINE (duration)	CONSEQUENCES (expected outcomes)	CAUSE	CONTROL (yes/no)
Symptoms	Perceived time	Physical disability	Lack of sleep Contact with sick individual	Treatments effective?

Figure 3.3: The five cognitive components of the self-regulation model

The first component is *identity*. This encompasses the symptoms of the disorder, and the labelling of these as an illness. Leventhal suggested that individuals automatically seek to provide a label for whatever symptoms they are experiencing. using abstract evidence and/or their own concrete experiences . For example, abstract evidence might involve using lay information or a label in the form of a diagnosis by a doctor. Alternatively, past experience (concrete evidence) may suggest a label for a set of symptoms a person may be experiencing. Leventhal described what he called the “symmetry rule”, whereby having symptoms leads to a search for a label, and having a label (e.g. being told by a doctor that you have diabetes) leads to a search for symptoms. A key point is that both perception and interpretation of information is necessary to produce a illness representation (Hagger & Orbell, 2003). Other rules also exist, including the “age-illness rule” and the “stress-illness” rule, whereby individuals may attribute their symptoms to ageing or to stress, rather than to illness.

While particular symptoms for common illnesses such as colds may be commonly known, for less frequently experienced illnesses, people may have less well-developed ideas about the likely symptoms. People may hold erroneous beliefs, in terms of current medical knowledge, about symptoms associated with medical conditions. For example, there is a common misconception that a myocardial infarction is always signalled by a crushing pain to the chest. In reality, other symptoms are also likely to be experienced, and crushing pain may not be experienced. Other medically important conditions, such as high blood pressure (hypertension) or elevated blood sugars (as in diabetes), may not cause any discernable symptoms. Once patients have an illness label, there is a tendency for them to attribute symptoms they experience after diagnosis to that illness. This may then lead to a mismatch between their beliefs and those of medical professionals about symptoms relevance.

The next dimension of illness representation is the *time-line* component. Illnesses are represented as having acute, chronic or cyclical time courses. Again, there may be a mismatch between the patient's beliefs about the likely timeline of their illness and the reality they actually encounter. This is partially explained by the fact that the majority of illnesses that people experience early in their lives tend to be acute, that is, short-term; whereas other health problems that may be chronic or cyclical are generally encountered in later life (Petrie & Pennebaker, 2004). Therefore, people lack experience of the actual implications of such timelines.

The third component in the illustration above is referred to as *consequences,* referring to the impact of the illness as the individual perceives it. This includes both physical and social effects (such as physical limitations or restriction of social life) and psychological effects (such as challenges to the self-identity and beliefs about restrictions that the illness might cause). Consequences beliefs have been found to be directly related to outcomes. For example, a study in Ireland of the factors that delayed patients seeking treatment when suffering an acute MI found that male patients who perceived an MI as having more serious consequences were less likely to delay seeking treatment (Walsh, Lynch, Murphy & Daly, 2004) . However, this relationship between outcome (or prognosis), in terms of future levels of disability or functioning, and consequences can also have a confounding effect when measuring beliefs about consequences. For example, an individual who believes that their future prognosis is poor (whether this is actually the case or not), may well believe that their illness has had (and will have) a severe consequence on their life. In other words, beliefs about illness severity and prognosis contribute to beliefs about the consequences of the illness. Further research on MI patients by Petrie and Weinman, amongst others, has demonstrated the possible negative effects of this inter-relationship. These authors found that patients who believed that the outcome of an MI was negative demonstrated catastrophic thinking (greater belief in consequences and poor controllability beliefs), and were less likely to attend or complete cardiac rehabilitation, and were slower to return to work (Petrie & Weinman, 1997). Hence, their beliefs about the outcome of their MI affected their beliefs about the consequences for them.

The fourth component relates to beliefs individuals hold about the *causes* of illness or threats to their health (such as asthma or diabetes which may be symptom free and not experienced as illness). As with many of the other components discussed so far there are a wide range of possible interpretations that the individual may make, which, again, may or may not reflect current medical thinking. Once again, these interpretations may influence both the practical response (e.g. the treatment sought, management strategies put into place) and the emotional response (e.g. fear, self-blame or guilt) of the individual. Consequently, the individual's beliefs about the causes of their illness can have a major impact on outcome. These causal cognitions may have adaptive or maladaptive outcomes in terms of patients' behaviour and responses. However, an appropriate educational intervention, designed to increase knowledge, might modify maladaptive cognitions.

Causal attributions for health threats and illness have been widely examined in the literature, particularly in relation to conditions such as heart disease, especially myocardial infarction. Causal attributions can be coded either in terms of their content (eg. the cause of my heart attack was stress, or smoking, or being overweight) or in terms of underlying dimensions, such as whether the condition was caused by factors which were internal to the person, controllable, stable.. The dimensional format has long been suggested to provide a better basis for predicting the consequences of an attribution ; however, the majority of studies in this area used attributional categories (Roesch & Weiner, 2001). An example of such an approach is that of Weiner's (1985) attribution-emotion model, which was developed to explain emotional and behavioural responses to a wide range of events. The model conceptualises causal attributions along a three major component dimensions, these being locus of causality (ie is the cause internal or external to the actor), stability and control. The dimensions appear to vary systematically with the time-line, cause and control aspects of the self-regulation model. Research into causes of illness within the self regulation model has identified a number of overarching categories, including biological, environmental, emotional and psychological causes; however, there is sometimes an overlap between the super-categories in terms of the individual causes that make them up.

For example, depression may be categorised in both the emotional and psychological super-categories (Hagger & Orbell, 2003). The individual may also believe there are multiple causes for their illness, some more important than others, and the different potential causes may have a temporal relationship to each other. In relation to heart disease an individual may believe that a genetic predisposition may be the primary cause of them developing heart disease (distal cause), but may also believe that if they had not had a highly stressful life, or had had a healthier lifestyle they may have avoided developing the disease (proximal causes).

The final component, whether the individual believes their illness is *controllable* or not, can directly influence whether the individual decides to engage with treatment or not (Petrie & Pennebaker, 2004). Patients who believed that their heart disease was controllable were more likely to attend cardiac rehabilitation after an MI or CABG (Cooper, Lloyd, Weinman & Jackson, 1999). As discussed above, the control dimension is likely to be interrelated with the cause dimension. Furthermore, as with all the previous components discussed, the actual controllability or curability of a condition, in terms of current medical thinking, may not be the same as the individual's perceptions.

While for all individuals, their cognitive representations of health threats can be described along the five dimensions outlined above (identity, timeline, consequences, cause and controllability), there may be wide inter-individual variations in the contents of the model for the same illness. For example, one post-MI patient may believe that his or her lifestyle caused the MI, and, hence, choose to attend rehabilitation to learn how to address these issues, whereas a patient who believes that his or her MI was caused by genetic factors may not see the point in making such lifestyle changes. This was acknowledged by Leventhal as he developed the model (Leventhal et al., 1980), when he suggested that there would be different illness representations both between individuals with similar illnesses and within individuals across different illnesses. It should also be acknowledged that individual's models of their illness are likely to be complex with interdependent dimensions, particularly in terms of their control and causal beliefs. However, there do appear to be general consistencies in relationships between the components; for example, an illness with a long time-line and low controllability will generally be seen as having severe consequences (Hagger & Orbell, 2003; Petrie & Pennebaker, 2004).

While there is a long established acknowledgement that the five dimensions do intercorrelate and relate to each other in theoretically meaningful ways, there is good evidence that the five dimensions are conceptually distinct (Hagger & Orbell, 2003). There has, however, been some discussion about the true number of underlying dimensions. For example, Heijmans and de Ridder (1998) applied the model to chronic fatigue syndrome (CFS) and Addison's disease (AD), and found four factor solutions for both illnesses (CFS – manageability, seriousness, personal responsibility, and external cause; AD – seriousness, cause, chronicity, and controllability). These differed from both each other and the dimensions suggested by Leventhal et al. (1980). However, it has been argued that these dimensions did not differ to any great extent form the original model (Hagger & Orbell, 2003); with both illnesses identifying a cause and control (manageability) dimension. Hagger and Orbell, in their meta-analytic review of CSM studies across a range of illnesses found that different methods of measuring the dimensions produced differing numbers of dimensions which were named differently in some cases. However, the dimensions did seem to cluster around the original dimensions suggested by Leventhal (Leventhal et al., 1980), supporting the overall construct validity of the CSM. The development of measures of this model will now be discussed.

3.2.3 The development of measures of the Common-Sense Model

Initial work by Leventhal and his colleagues involved exploring the CSM by carrying out in-depth, semi-structured interviews . However, this approach involved a large time commitment and produced data of variable quality (Weinman et al., 1996); it is also difficult to compare the results of such studies due to the differing data collected. These problems led to Leventhal and others developing questionnaires to assess the illness representations aspects of the CSM (Lacroix, 1991; Prohaska, Leventhal, Leventhal, & Keller, 1985). These questionnaires were limited to the specific patient groups they were developed for, however, and were not clearly developed from the original theoretical model, leading to the need to develop a more robust measure (Weinman et al., 1996).

The primary measures developed to assess the CSM are the Illness Perception Questionnaire (IPQ), developed by Weinman and colleagues (Weinman et al., 1996), and the revised version of this, the IPQ-R (Moss-Morris et al., 2002). The original IPQ was developed to provide a psychometrically strong theoretically based measure of the CSM, which could also be adapted to cover a range of different illnesses. The questionnaire was designed to assess the five dimensions of cognitive representations of illness (illness identity; cause; timeline; consequences; and control/cure). Initial assessment of the measure was performed by comparing it with the semi-structured interview format developed by Leventhal and Nerenz (1985) on a group of 52 people with insulin-dependent diabetes. This comparison with the interview format demonstrated similar themes were found using both methods, however, the questionnaire tended to produce a more comprehensive set of responses than the interview format (Weinman et al., 1996). More formalised assessments of the validity and reliability of the measure were performed by giving the questionnaire to a range of seven different patient groups from London and New Zealand, which provided support for this measure (Weinman et al., 1996).

Since its development the IPQ has been used to assess IPs in a range of different illnesses. Patient groups studied included those with vitiligo (Papadopoulos, Bor, Walker, & Legg, 2001); rheumatoid arthritis (Scharloo et al., 1998; Schiaffino, Shawaryn, & Blum, 1998); chronic obstructive pulmonary disease (Scharloo et al., 1998); psoriasis (Scharloo et al., 1998); asthma (Horne & Weinman, 2002); multiple sclerosis (Schiaffino et al., 1998); MI patients (Petrie, Cameron, Ellis, Buick, & Weinman, 2002; Walsh, Lynch, Murphy, & Daly, 2004) and MI and CABG patients referred to or undergoing cardiac rehabilitation (Cooper, Lloyd, Weinman, & Jackson, 1999; Michie, O'Connor, Bath, Giles, & Earll, 2005; Petrie, Weinman, Sharpe, & Buckley, 1996; Whitmarsh, Koutantji, & Sidell, 2003). The studies looking at heart disease patients will be discussed further in the next section. Overall, the studies concluded that the IPQ is a suitable instrument for the measurement of IPs, that it produces measures which help explain illness related behaviour, and thus have predictive validity. For those studies comparing more than one illness or condition, the IPQ also distinguished between them (Scharloo et al., 1998; Schiaffino et al., 1998), showing discriminant validity.

However, while the results of such studies are supportive of the IPQ, feedback showed both problems with the internal consistency of the cure/control and timeline subscales (Moss-Morris et al., 2002) .Factor analysis of cure control responses produced two separate factors (self-efficacy / personal control; and outcome expectancies), which were only weakly correlated. Therefore, two separate subscales were deemed necessary. The original three items in the IPQ timeline subscale were insufficient to ensure internal consistency; in addition, the concept of a cyclical time-line discussed in the original formulation of the CSM was not addressed. Examining the overall IPQ also led to the realisation that, while it covered cognitive representations of health threats, it did not address the emotional representations which were an integral aspect of the original model. This led the team of researchers to design a revised version of the IPQ, the IPQ-R (Moss-Morris et al., 2002). As well as the splits in the control and timeline sub-scales detailed above an emotional representations subscale was added to more fully cover the original CSM; this was designed to cover six attributional responses that had been linked to both changes in illness perception and treatment decisions (Cameron & Leventhal, 2003). An illness coherence subscale was added by the researchers as they found that there was a need to explore how much patients understood their illness (Moss-Morris et al., 2002).

A reliability and validity study of the revised measure was assessed, once again carried out in both New Zealand and the United Kingdom, and again with a range of illness groups, indicated that the IPQ-R was a better measure of the IPs component of the CSM. Other early studies also supported this revised questionnaire in terms of its factor structure (Hagger & Orbell, 2005), and its applicability to a range of illnesses such as anorexia nervosa (Holliday, Wall, Treasure, & Weinman, 2005), schizophrenia (Lobban & Barrowclough, 2005), and HIV (Johnson & Folkman, 2004)

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Having detailed the development of quantitative measures of IPs, research applying the CSM to cardiac patients will now be reviewed. Initially, the role of cognitive representations in predicting behaviour changes such as lifestyle change or attending rehabilitation will be discussed, followed by the relationship between emotional representations and emotional outcomes or emotional regulation strategies, and finally the changes in IPs that can occur due to cardiac events will be considered.

3.3 Applying the Common-Sense Model to cardiac disease

3.3.1 The role of cognitive representations in predicting behaviour change in cardiac patients

This section will examine the success of cognitive representations of the CSM in predicting secondary preventative behaviours such as exercise or dietary change, and attendance at cardiac rehabilitation. Initially associations between IPs and attendance at, or completion of, cardiac rehabilitation will be reviewed. Details of the relevant studies are given in table 3.1 overleaf.

Table 3.1 Studies of cognitive representations as correlates or predictors of cardiac rehabilitation attendance

Paper	Population group	Relevant aim(s)	IPQ measure used	Relevant outcome measure(s)	Findings
Petrie, Weinman, Sharpe & Buckley (1996)	Quantitative N= 143 <65 years (mean= 53.2) First MI	Examined association between IPs and: attendance at rehab, time taken to return to work, functioning outside work, and sexual difficulties at 3 & 6 months later	IPQ – 4 subscales: Identity, timeline, consequences, cure/control	Attendance at rehab	Attenders at rehab significantly more likely to score higher on cure/control at baseline (admission)
Cooper, Lloyd, Weinman & Jackson (1999)	Quantitative N=152 39-81 years Hospitalised due to MI or CABG	Examined association between IPs at baseline and attendance at rehab (6 months post discharge)	IPQ – cure/control, consequences, timeline, causal attributions (lifestyle and stress)	Attendance at rehab	Attenders scored significantly higher on cure/control, consequences and attribution to lifestyle than non-attenders (after logistic regression consequences not significant)
Whitmarsh, Koutantji & Sidell (2003)	Quantitative N= 93 Mean age 63.9 years Invited to attend rehab after MI	IPs would predict attendance at rehab	IPQ	Attendance at rehab (at least 50%)	Attenders scored significantly higher on identity, consequences subscales and were less likely to see their cardiac problems as caused by a germ / virus than non / poor attenders
French, Lewin, Watson & Thompson (2005)	Quantitative N=194 Mean age 63.3 years In hospital after MI	Investigate role of IPs in predicting attendance at rehab; how this differs with age, previous MI or anxiety / depression	IPQ – cure/ control, consequences, timeline, causes	Attend at least one session of rehab	No difference in IPs between attenders and non-attenders

French, Cooper & Weinman (2006) – systematic review	Quantitative N= 906 from 8 studies mean age range 53.2 to 63.9 Mostly collected in hospital, all prior to rehabilitation	Meta- analysis of extent to which IPs predict attendance at rehab	IPQ/ IPQ-R/ Brief IPQ	Attendance at rehab mostly one session or more cut off	Attenders scored significantly higher on identity, cure/control, consequences and illness coherence scales than non-attenders. After statistical correction for meta analysis only cure/control significant
Yohannes, Yalfani, Doherty & Bundy (2007)	Quantitative N=189 Mean age = 61 completers of rehab, 59 years non-completers Post MI patients referred to rehab (some had CABG or PTCA after MI)	Investigate whether completers of rehab differed from early drop outs in relation to IPs, sociodemographic factors, psychological distress or QoL	IPQ-R	Attendance at rehab: completers all 12 sessions; non-completers < 4 sessions	Completers scored significantly higher on timeline acute/chronic, consequences, and treatment control and significantly lower on personal control and identity than non-completers Stepwise logistical regression: lower consequences, higher personal control and poor treatment control more likely to be non-completers

Table 3.1 includes quantitative studies with samples of MI patients, some but not all of whom had had cardiac surgery as a result of their MI. The systematic review in table 3.1 (French, Cooper & Weinman, 2006) included studies that had not been published.

Most of the papers in Table 3.1 used the original IPQ, though there was variation in the subscales chosen, with the cause and identity subscales not always included. In the case of the cause subscale there were also substantial variations in how this was assessed when it was included. There were also differences between the studies in how they defined attendance at rehabilitation, with the majority counting attending a single session as proof of attendance. Those studies with stricter conditions also varied, with Whitmarsh et al (2003) requiring 50% attendance but Yohannes et al (2007) requiring perfect attendance over the full 6 week programme.

The studies in Table 3.1 produced variable findings. Early research found that perceptions of control were important drivers of attendance at rehabilitation, with consequences sometimes being predictive of attendance but often not at a significant level. In later studies, using the IPQ-R which splits control into personal and treatment related control, the findings were more inconsistent. Overall, effect sizes were small, indicating that cognitive representations of cardiac problems alone are not sufficient to predict attendance at cardiac rehabilitation. A recent qualitative study (Pullen et al., 2009) supports this assertion, as it found that beliefs about the usefulness of cardiac rehabilitation (that is, treatment perceptions) and available social support, also played a role in determining intentions to attend. A further recent qualitative study examined whether perceptions of exercise may have affected the decision to attend rehabilitation in a group of non-attenders after MI (McCorry et al., 2009). Participants in this study did not see the value of exercise in recovery from MI and believed that general daily activities were sufficient for recovery; they also felt that their health professionals had emphasised the value of medication for recovery rather than exercise. It should be noted though that non attendance may also have been related to patients' views on the cause of their cardiac problems, with only 2 of the 14 participants seeing their lifestyle as having a role to play in their MI.

Differences in findings from studies in table 3.1 may be explained by the different assessment tools used and the definition of attendance at rehabilitation, but also the time point at which the patients completed the measures (or were interviewed). While most participants filled in questionnaires while they were hospitalised after an MI there were differences in how long after the MI, as some had CABG or PTCA procedures prior to the questionnaires being filled out, and in some cases the data collection took place sometime after discharge (Whitmarsh et al., 2003; Yohannes et al., 2007). This may have led to disparities in findings due to the fact that IPs change over time. The recent experience of an MI or heart surgery may have had a major effect on participants' IPs in the short term. A study by Cooper, Weinman, Hankins, Jackson and Horne, 2007 developed a scale to assess patients' beliefs about cardiac rehabilitation prior to attendance and validated this against the IPQ-R. They found that those who believed rehabilitation was necessary had stronger treatment and personal control beliefs, and greater understanding of their condition, while those with concerns about the exercise component of the rehabilitation programme had weaker personal control and coherence and greater emotional representations. This indicates the complex interactions between IPs and treatment perceptions, which may be missed in studies looking at attendance solely as a yes or no construct. Others who have examined why individuals do not attend rehabilitation or change their behaviour after PTCA have found that many individuals believe that the procedure has cured them; therefore they do not need to practice preventive behaviours (Peterson et al., 2010).

While rehabilitation attempts to change individuals' behaviour to improve long-term outcome it is clear that not everyone attends rehabilitation. Therefore it is useful to examine the how cognitive representations relate to changes in lifestyle behaviours outside of rehabilitation. Studies which have done this are detailed in table 3.2.

Table 3.2 Studies of cognitive representations as correlates or predictors of lifestyle change in cardiac patients

Paper	Population group	Relevant aim(s)	IPQ measure used	Relevant outcome measure(s)	Findings
Gump et al. (2001)	N=309 Mean age = 62.8 CABG patients baseline before surgery, follow up at 6 months	Investigate whether beliefs about cause, duration and perceived control over CHD relate to health behaviours post-surgery, and whether this was affected by age	Measures of timeline (2 items), control (1 item), cause (6 dimensions – old age (1 item), genetics (1 item), health damaging behaviour (2 items), health protective behaviour (2 items), emotions (4 items) & fate (2 items)	Changes to emotion and attitude, diet and exercise, modifying drinking & quitting smoking (totalled to form one item overall)	Those who saw health damaging behaviours as causal and had high belief in personal control showed greater health behaviour change Younger participants reported greater changes than older.
Figueiras & Weinman (2003)	N= 70 (couples) Mean age = 53.2 for MI patients All male first MI, assessed baseline (3 month post discharge), follow up at 6 & 12 months	How similar are patient and partners perceptions of patients MI; are congruent perceptions associated with better recovery	IPQ – identity, timeline, consequences, cure/control (used 3 point scale rather than usual 5 point likert scale)	Diet, previously used measure for post-MI patients (Weinman et al, 2000)	Similar positive cure/control beliefs linked to improved diet
Byrne, Walsh & Murphy (2005)	N= 1084 mean age = 66 Random selection of	Can variations in secondary preventative behaviour be	IPQ-R	Exercise – Godin Leisure Time Exercise Questionnaire;	Exercise – greater personal and treatment control & greater coherence more likely to exercise; only independent IP predictor was

	patients with established CHD from GP practices in Ireland	predicted by IPs and beliefs about medication		Smoking status; Alcohol consumption; Dietary fat consumption	emotional representations (higher emotional re predicts lower exercise score) Smoking – no IPs independently predictive Alcohol consumption – greater belief in own behaviour as cause & lower emotional representations predicted greater alcohol consumption Dietary fat – no IPs predictive
Lau-Walker (2007)	N= 253 at baseline in hospital, 194 at 9 month follow up, 140 at 3 year follow up Hospitalised after MI or angina	Investigate the association between IPs and self-efficacy 3 years post discharge	IPQ – identity, timeline, consequences, cure/control	Generalised self efficacy scale, cardiac diet and exercise self efficacy instruments	Generalised self-efficacy – no IPs predictive Cardiac diet self-efficacy – no IPs predictive Exercise self-efficacy – those who thought illness was more long-term, had lower identity scores and greater control scores at baseline had significantly greater exercise self-efficacy scores at 3 year follow up; those who had lower identity scores and believed cardiac problems as long term at 9 months follow up also had greater exercise self-efficacy
Leung, Ceccato, Stewart & Grace (2007)	N=600 at baseline in hospital,506 at 9 month follow up, 465 at 18 month follow up Cardiac inpatients (MI,	Longitudinal examination of exercise patterns; investigate any associations between sociodemographic, clinical, psychosocial and	IPQ-R – timeline (cyclical and episodic), consequences, personal control, treatment control and cause (my own behaviour question only used for	Classification of exerciser / non by median split at each time point; exercise pattern (maintainer – exerciser all 3 points; inactive –	Exercisers less likely to attribute cause to own behaviour than inactive or irregular exercisers

	CABG, PTCA, unstable angina)	environmental factors and exercise patterns	analysis)	non at all time points, irregular – not exerciser on 2 consecutive time points	
Stafford, Jackson & Berk (2008)	N=193 Mean age= 64.1 Hospitalised for MI, CABG, PTCA Baseline 3 mths post discharge, follow up 6mths & 9 mths	Hypothesised that greater adherence to secondary behaviours (not smoking, exercising, losing weight, taking medicine & alcohol in moderation) associated with greater control beliefs, higher consequences, and more symptoms	IPQ-R – consequences, personal control, treatment control, timeline (acute chronic), causes (stress, lifestyle, heredity / biological factors), identity	Modified Specific Adherence Scale from Medical Outcomes Study	Higher scores on consequences at baseline significantly associated with greater adherence at 9 month follow up
Rimington, Weinman & Chambers (2010)	N=225 at baseline, 204 at 1 year follow up Mean age = 67.1 All about to undergo cardiac valve replacement	To assess performance on a 6 minute walk and QoL 1 year post surgery and see what preoperative predictors there are for this	IPQ-R	Performance on 6 minute walk task; QoL as assessed by SF-36	Walk task – higher beliefs in personal and treatment control and lower illness coherence at baseline were significantly associated with performance on task at 1 year. After stepwise regression only treatment control remained significant Physical QoL – lower scores on consequences, coherence and emotional representations at baseline were significantly associated with higher physical QoL at 1 year. All excluded after stepwise regression

					Mental QoL – lower consequences, timeline cyclical and emotional representations at baseline significantly associated with higher mental QoL. All excluded after stepwise regression.

The studies described in table 3.2 are all quantitative. The majority of the studies use a version of the IPQ-R (in full or in part), although some earlier ones used the IPQ. Although a large proportion of the participants had experienced an MI, as in the cardiac rehabilitation studies, there was variation in participants' diagnostic background – with some undergoing cardiac surgery and others having more long term CHD problems such as angina. There were also wide variations in the timings of baseline data collection, from pre-surgery through to 3 months post discharge which may have led to variations in findings due to the changing nature of IPs over time (Devcich, Ellis, Gamble & Petrie, 2008).

Findings were inconsistent, partly due to the wide variation in outcome. Although some studies find that attributing cause of cardiac problems to lifestyle leads to increased exercise, another study contradicts this (Leung et al., 2007). However, the latter finding may be due to the fact that Leung and colleagues designated as exercisers those patients who consistently did more exercise than their fellow participants, rather than using an independent assessment (for further details on this study see chapter 5). Increased personal and treatment control were generally related to higher levels of exercise, which may in turn be related to participants' self-efficacy or confidence in their abilities to perform these exercises (Lau-Walker (2007). Higher illness coherence was linked to increased exercise in one study (Byrne et al., 2005), but was predictive of poorer performance on an actual exercise task in another study (Rimmington et al., 2010). It should be noted though that these two studies looked at very diverse patient groups.

Overall, there is less consistency in the associations between cognitive representations of cardiac problems and lifestyle behaviour change than was the case for the rehabilitation studies already discussed. It should be noted that different cardiac population groups typically have different profiles of IPs, and at an individual level, these are affected by the severity of the individual's cardiac problems (Aalto, Heijmans, Weinman & Aro, 2005). Thus, the variation in findings is not unexpected. The Rimington et al study detailed above reported the associations between emotional representations and emotional outcomes (in this case QoL), with more negative emotional representations being associated with poorer QoL. The following section examines emotional representations and emotion regulation in greater detail.

3.3.2 The role of emotional representations in emotional regulation strategies and emotional outcomes

It is known that acute cardiac events such as MI, CABG or PTCA may lead to poor emotional outcome in a variety of ways (Crumlish, 1994; Oxlad & Wade, 2006; Murphy et al., 2008). In males, different emotional outcomes are associated with MI and CABG (Murphy et al.); some CABG patients suffered more than MI patients from post-operative depression, itself associated with increased pain and poor functioning (Con, Linden, Thompson & Ignaszewski, 1999). Poor emotional outcome may be related to poor emotional functioning prior to surgery (Genardini, Wilson, Lawrence & Hare, 2008). This section will examine the relationship between emotional representations of cardiac problems, the use of emotion focussed coping strategies and emotional outcomes. It should be noted that this relationship may be affected by the potential overlap between the constructs of emotional representations and emotional outcome such as anxiety and depression. Of particular relevance to this research is the fact that the QoL measure used (the MacNew) has an emotional dimension which may lead to an overlap between this measure and emotional representations. Details of relevant studies are shown in table 3.3.

Table 3.3 Studies linking emotional representations, emotional regulation strategies and emotional outcomes in cardiac patients

Paper	Population group	Relevant aim(s)	IPQ measure used	Relevant outcome measure(s)	Findings
Oxlad & Wade (2006)	Quantitative N=119 Mean age = 63.3 Patients due to undergo elective CABG or CABG & valve replacement in next 30 days	Does coping mediate the relationship between IPs and pre-operative psychological adjustment, disease severity controlled for	IPQ-R – summed IPQ score from summing timeline (acute/ chronic), consequences, emotional representations, personal control, treatment control	Depression – Depression and Anxiety Stress Scales; Pre-operative trauma – Post – Traumatic Diagnostic Scale	More negative IP associated with increased avoidance coping and increased depression and PTSD Avoidance coping partially mediated association between negative IPs and PTSD
Hermele, Olivo, Namerow & Mehmet (2007)	Quantitative N=56 Mean age = 66.1 Pre-operative CABG patients 2 – 4 weeks before surgery	Assess the associations between IPs and psychological well-being	IPQ-R - timeline (acute/chronic), personal control, treatment control, consequences, illness coherence, emotional representations	Profile of Mood States	Emotional representations significantly associated with all POMS (greater emotional representations associated with poorer overall mood, increased tension-anxiety, depression – dejection, anger-hostility, fatigue-inertia, and confusion-bewilderment, decreased vigour-activity) Poorer illness coherence associated with poorer overall mood and greater depression-dejection and anger-hostility

White, Hunter & Holttum (2007)	Qualitative N=5, all female 2 age range 41-50, 3 age range 51-60 All had first MI in last 6 mths	Explore adjustment to MI and impact of MI on relationships and coping strategies	Cognitive & emotional responses – fear & anxiety, anger & frustration, sadness & loss	Coping strategies – self, others/ support, cardiac rehab	All reported cognitive & emotional responses. Range of coping strategies used – strong belief in value of returning to normality and support from others, though 2 found professionals not as useful as could have been
Oxlad & Wade (2008)	Quantitative N=119 Mean age = 63.3 Patients due to undergo elective CABG or CABG & valve replacement in next 30 days, follow up on discharge, and 3 &6 mths later	Change in coping methods would mediate association between IPs and post-operative psychological functioning	IPQ-R – summed IPQ score from summing timeline (acute/ chronic), consequences, emotional representations, personal control, treatment control	Depression & anxiety – Depression and Anxiety Stress Scales; Pre-operative trauma – Post – Traumatic Diagnostic Scale	Depression at 6 mths predicted by increased use of information seeking coping at discharge, more negative IP at 3 mths approached significance Anxiety and PTSD at 6 mths predicted by negative IP at 3 mths
Alsen, Brink, Persson, Brandstrom & Karlson (2010)	Quantitative N=204 Mean age = 64 Baseline assessment 1 week post MI, follow up after 4 mths	Identify associations between IPs, anxiety, depression, fatigue, somatic health problems and HRQoL	IPQ-R – timeline (acute/chronic and cyclical), consequences, control/cure, illness coherence, emotional representations	HRQol – SF-36	Greater physical and mental QoL associated with significantly lower timeline scores (both), consequences, and emotional representations and greater personal and treatment control and illness coherence

Several of the studies detailed in table 3.3 looked at patients about to undergo CABG, and assessed IPs using the IPQ-R. Oxlad and Wade used a summed score for illness representations in their studies so the independent role of emotional representations was unclear in these two studies. Qualitative studies or quantitative studies that did not use the IPQ-R were difficult to incorporate into the table, as it was not clear how their measures related to the emotional representations concept.

There were considerable variations in outcome measures used, including measures of psychological distress and QoL. However, the overall conclusion from the studies is that negative emotional representations are associated with poorer psychological outcome. Emotional regulation was also assessed by a range of methods, but there was some evidence that emotion regulation strategies can mediate the relationship between illness representations and emotional outcome (Oxlad & Wade, 2006). In particular, those with a more negative overall IP were significantly more likely to have an increased use of avoidance coping and an increased level of PTSD symptomology pre-surgery. When avoidance coping was controlled for the association between IPs and PTSD symptomology was reduced but still significant, indicating that this was a partial mediation.

From the studies by Hermele et al and Alsen et al it is also clear that emotional outcomes are associated with certain cognitive representations. Hermele and colleagues found that those with a greater sense of personal control were also likely to score higher on the vigor-activity subscale, and a lesser sense of illness coherence was associated with greater depression-dejection, anger-hostility, and overall total negative mood on the POMS. In contrast, Alsen et al found that personal control and illness coherence were not associated with the Mental Component Score (MCS) of the SF-36. However, there were significant negative associations between MCS and timeline (both acute/chronic and cyclical), and MCS and consequences; and a positive significant association between MCS and treatment control.

Alsen et al’s findings are similar in some areas to other studies. Aalto et al (2006) found that for individuals with established CHD, fewer symptoms (identity), and consequences, a greater sense of control were predictive of better QoL; while Lau-Walker, Cowie and Roughton (2009) found that fewer symptoms in CHD patients admitted to hospital due to MI or angina predicted better mental QoL nine months later. More recently, Dickens and colleagues found that the development of depression in the 12 months after an MI was predicted by participants’ perceptions while hospitalised (2008). Perceiving the MI as having severe consequences and being a chronic condition was associated with the development of depression. Stafford, Berk and Jackson (2009) also found that depression at 3 and 9 months post discharge in patients hospitalised for MI, CABG or PTCA was predicted by their perceptions of severe consequences at the 3 month time point. In addition they also found that better mental QoL at 9 months was predicted by fewer symptoms and a greater sense of personal control at 3 months. The contrast with the findings of Hermele et al may be due to the fact that this is the only study detailed where all participants were CABG patients awaiting surgery, which may have affected their IPs.

Emotional representations have also been found to have associations with physical outcomes, with Trovato and colleagues (2010) finding that negative emotional representations predicted the physical component of the Seattle Angina Questionnaire (a measure of QoL) in patients hospitalised for PTCA. None of the cognitive representations were significant predictors. The Alsen et al study also had significant associations between emotional representations and the physical component of QoL.

On the evidence so far, it seems that the relative importance of the different components of the model vary according to the situation and patient group. This is supported by Walsh, Lynch, Murphy and Daly (2004) who found that when actually experiencing an MI individuals' cognitive representations seemed to "override" their emotional representations in order for them to seek help. The next section will briefly look at how cardiac events can influence and alter IPs.

3.3.3 Changes in illness perceptions

Research has shown that having cardiac surgery is associated with change in IPs. A study by Astin and Jones (2006) collected data from 117 patients prior to their PTCA and at 6 to 8 months later. They found that the number of symptoms identified as related to cardiac problems significantly declined over time, as would be expected, but that in addition there was a significant decline in timeline score, indicating that the patients believed their illness to be less long term, and a significant reduction in the consequences score. Interestingly, these patients also had a significant reduction in the belief that their illness could be cured or controlled by themselves or treatment; this may be due to participants' belief that the PTCA has "cured" them so their illness no longer needed managing, a belief which may have been reinforced if they have had a reduction in symptoms and medication levels after surgery. Even receiving the results of diagnostic angiograms have been found to lead to changes in IPs. Devcich, Ellis, Gamble and Petrie (2008) found that receiving a normal result led to a reduction in the number of symptoms attributed to cardiac disease, reduced consequences and emotional representations, while these representations were unchanged in those who received a diagnosis of coronary artery disease. Illness coherence improved for both groups as would be expected from undergoing a diagnostic procedure.

Undergoing cardiac rehabilitation has been associated with change in some IPs. One study gave patients the IPQ before they started rehabilitation, eight weeks after their final session, and again eight months later (Michie et al., 2005). At both the eight week and eight month follow ups perceived control was significantly improved, but no other IPQ subscales were significantly changed. However, this study did not have a control group, so improvements in perceived control cannot be clearly attributed to the cardiac rehabilitation programme alone but may be due to general improvements in health or the effectiveness of strategies put into place to improve health recommended by other health professionals or lay individuals outside of the rehabilitation programme.

IPs have also been targeted in interventions to improve outcome in patients who have recently suffered an MI. An in-patient intervention tailored to the individual according to their responses of the IPQ found that attempting to change erroneous perceptions (such as the belief in the need to reduce physical activities in the long term) led to significantly positive changes in patients belief about their MI; patients were also more likely to return to work faster than those in a control group, and reported fewer angina symptoms at follow-up 3 months later (Petrie et al., 2002). The Brief IPQ (together with the cause subscale from the IPQ-R) has also been used to tailor individual programmes in a more recent intervention (Broadbent, Ellis, Thomas, Gamble & Petrie, 2009). These authors found that the intervention led to changes in causation beliefs and improved illness coherence at discharge that were also evident at 6 month follow up. Participants were also more likely to return to work, and to do so more quickly than the control group. These randomised prospective interventions indicate the possible value of this approach; however, others have suggested that attempting to change causal attributions as part of such interventions may be harmful in terms of psychological adjustment, as by not attributing their problems to themselves or others allows individuals to avoid self-blame and guilt, and hence affect future perceptions of control (French, Maissi, & Marteau, 2005).

While IPs and the individual's expectations may influence outcome, as can be seen from figure two earlier, the strategies the individual chooses to cope with their illness (such as help-seeking) are appraised and therefore feed back into, the individual's illness beliefs, and may lead to a change in illness beliefs over the course of the illness, depending on how the success, or failure, of such strategies is appraised by the individual. There has been discussion about whether the controllability component of the CSM should be seen as a summary of expectations with respect to coping , emphasising still further the importance of also examining the coping procedures adopted by individuals. While the areas of behavioural change and in particular attending cardiac rehabilitation can be seen as a way of addressing the cognitive representations that may be related to poor outcome, there is also a need to assess the emotional regulation that is needed to address the emotional representations of the individual. For the purposes of the present research these coping strategies will be assessed using the Coping with Health Injuries and Problems (CHIP) measure. The next section will introduce this measure.

3.4 Coping with Health Injuries and Problems (CHIP) measure

Coping is defined as "the thoughts and behaviours that people use to manage the internal and external demands of situations that are appraised as stressful" (Folkman & Moskowitz, 2004, pp. 746-747). Coping has been a major topic within the field of psychology for over 60 years, and in particular since the 1970s (Lazarus, 1999; Lazarus & Folkman, 1984). Much of the current research into coping is based on the contention of early work by Lazarus and Folkman (1984) that coping serves two purposes: firstly, addressing the emotional distress felt (emotion-focussed coping), and, secondly, addressing the problem causing the distress (problem-focussed coping). Hence, it can be seen that this combination maps clearly onto the CSM detailed earlier.

A content analysis of coping literature carried out by Parker (1996, cited in Endler, Parker & Summerfeldt, 1998) found that around 40% of studies into coping strategies were in the health field. However, there seemed to be a lack of consistency when selecting which coping measures to use, with some using generic measures which, while they can be used across a range of situations, are perhaps inappropriate in patient populations. Others have used very specific measures which lack proper development as well as reliability and validity assessment. Due to this, Endler and his colleagues saw a need to develop a coping measure that assessed coping strategies in a range of patient populations. The CHIP (Endler, Parker & Summersfeldt, 1998) is also designed to allow the measure to be used repeatedly in order to assess whether the coping strategies used by an individual differed over time.

The CHIP measure itself is made up of 32 questions which load equally (n=8) across four factors – emotional preoccupation coping, instrumental coping, distraction coping and palliative coping. These were derived from a combination of literature searching and using questions from other coping scales which produced an initial list of 120 items that were narrowed down to a final 32 items (Endler et al., 1998).

The CHIP has been used across a range of health problems. As mentioned earlier it has been found to be able to distinguish between individuals suffering from acute or chronic diseases (Endler et al., 2001), with chronic illness sufferers using significantly more distraction, instrumental and emotional preoccupations coping and significantly less palliative coping. It has also been found to be able to document changes in palliative care for women undergoing a stress reduction programme as part of their recovery from breast cancer. High levels of emotional preoccupation have been found to be associated with elevated health anxiety in a multiple sclerosis sample (Kehler & Hadjistavropoulos, 2009), and depression in early inflammatory arthritis patients (Dobkin et al., 2008) indicating a possible particular role for this subscale.

Of more relevance to the research to be reported in this thesis, the CHIP has been used with diabetes and cardiac groups. In early research, 115 individuals with a diagnosis of type 2 diabetes of at least 6 months duration were assessed on their coping styles, perceived control over their diabetes and anxiety and depression (Macrodimitris & Endler, 2001). Instrumental coping was the most heavily used form of coping, and high scores on this subscale were associated with lower depression. However, high scores for emotional preoccupation and palliative coping were associated with higher depression and anxiety.

A Canadian study that assessed changes in coping and health-related quality of life in a cardiac rehabilitation sample also used the CHIP (Corace & Endler, 2003), while QoL was assessed using the SF-36. The fifty patients who took part had undergone either CABG, PTCA or suffered an MI, and completed questionnaires when they were enrolled on a cardiac rehabilitation programme and again 3 months later. The authors expected that coping styles used would vary over time, with distraction, palliative and emotional preoccupation strategies being employed early on in the rehabilitation process with instrumental coping replacing these methods as rehabilitation progressed. They also expected that scores on the coping style subscales would predict QoL at both time points. However, they found that instrumental coping scores were higher than the other coping subscales scores at both time points. Poorer QoL at both time points was associated with greater use of emotional preoccupation and palliative coping strategies. In addition, changes in coping style were not seen over the course of the rehabilitation programme. Corace and Endler suggested that this is because while on the rehabilitation programme the patients were not exposed to any threats or challenges; that is, their cardiac situation remained fairly constant. The authors therefore conceded that an assessment of patients' coping strategy use prior to starting cardiac rehabilitation might have been more useful.

3.5 Summary

A large amount of research using the CSM as a framework for understanding how IPs and coping relate to outcome in people with cardiac problems has been reviewed. Much of the research using formal assessment of IPs has looked primarily at patients who have suffered an MI and whether their IPs shortly after this MI help to predict their attendance at cardiac rehabilitation or changes in their behaviour. These studies have tended to concentrate on assessing cognitive representations alone without also taking into account emotional representations and the emotional coping strategies that the patients may be using. It has also been shown both in the prior chapter and within this chapter that IPs and coping strategies are associated with emotional outcome, including aspects of QoL, in cardiac surgery patients. However, few studies have looked at these issues in combination. Therefore to fully evaluate the CSM for this patient group a more systematic review of the literature is needed. The following chapter details two reviews that attempt to answer two important questions. Firstly, do IPs predict QoL after cardiac surgery; and secondly, do IPs predict attendance at cardiac rehabilitation or lifestyle change after cardiac surgery. These reviews will allow for current review of the research into the main areas of interest in this thesis.

Chapter 4: Review Questions

The last two chapters have introduced the general research areas to be covered in this thesis; in this chapter the pertinent questions posed by this research will be addressed by means of two targeted reviews, updated in January 2010. The first of these posed the question: “Do IPs predict QoL after cardiac surgery?” and the second: “Do IPs predict attendance at cardiac rehabilitation or lifestyle change after cardiac surgery?”. These reviews allow for the inter-relationships between IPs (IPs) in cardiac surgery patients and the relevant outcomes of QoL and lifestyle change in past research to be examined in detail.

4.1 First targeted literature review

The first question addressed by a targeted literature review was “Do IPs predict QoL after cardiac surgery?”. Studies were included in the review if they involved primary analysis of data (either quantitative or qualitative); included adult cardiac surgery patients (CABG or PTCA) as at least part of the participant group; had QoL as an outcome measure, or if qualitative discussion of quality of life issues. The studies also needed to have a measure of IPs or related constructs or if qualitative, discussion of these constructs, and to be published in peer reviewed journals. The studies also needed to be published in English, due to the need of this researcher to fully comprehend the contents of the work.

Studies were excluded from the review if they were unpublished, published only in a thesis, or were a review rather than a primary analysis of data. Studies were also excluded if the participants were children (under the age of 18), or if the cardiac content related to non-cardiac surgery, cardiac surgery not including PTCA or CABG, mechanical devices, myocardial infarction, coronary artery disease alone without mention of surgical intervention, chronic heart failure, cardiac transplantation or congenital heart problems. In addition, a start date of 1996 was selected as this was the year that the first recognised questionnaire measure of IPs was published (Weinman, Petrie, Moss-Morris, & Horne, 1996). This publication means that the concept of such IPs can be more accurately assessed.

Four databases were chosen to perform the initial searches: Psycinfo, Web of Knowledge, Pubmed and CINAHL. The following search criteria were used when performing the searches:

Search Field 1: “Common-Sense model” OR perceptions OR cognitions OR representations OR beliefs
AND
Search Field 2: Cardiac OR “Heart attack” OR myocardial infarction” OR “Coronary artery bypass graft” OR CABG OR percutaneous transluminal coronary angioplasty” OR PTCA OR “coronary artery disease” OR CAD OR “coronary heart disease” OR CHD OR “cardiovascular disease”
AND
Search Field 3: “quality of life” OR “well being” OR well-being

The abstracts of the articles identified by these searches were read to identify which ones fulfilled the inclusion criteria, and should be potentially included in the review. This was carried out by the principal investigator, with cross checking by Dr Alison Wearden as supervisor. Half of the initial abstracts were examined by both individuals and any disagreement was handled by initial discussion and then looking at full papers to check on areas of disagreement (such as the measure of illness perceptions). Where it was unclear if papers fully met the criteria from looking at abstracts alone the full paper was obtained and examined (see appendix G for full details of the review procedure). Figure 4.1 shows the numbers of articles identified at all of these stages. Additionally, the reference lists of selected papers were examined to see if any additional papers could be identified; however no references fully met the inclusion criteria.

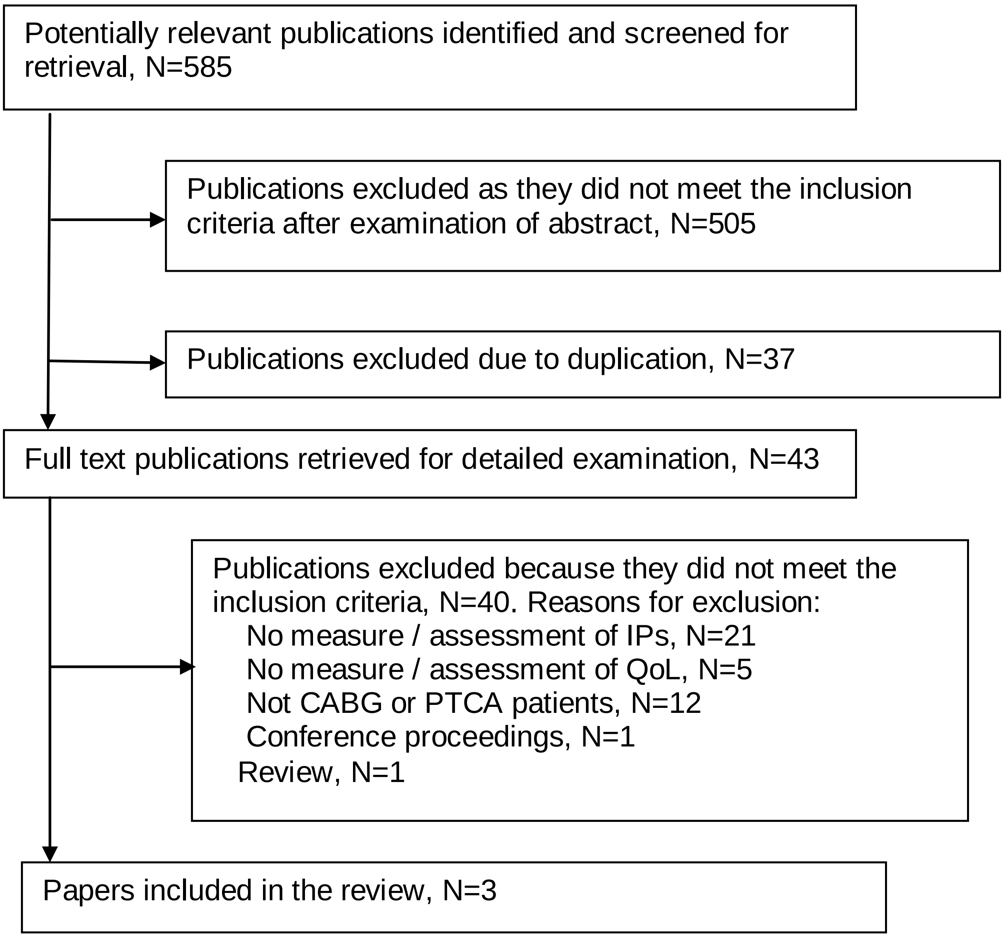

Figure 4.1 Flowchart illustrating the selection of articles for the first literature review

As can be seen from figure 4.1 three papers were included in the final review. Initially, details of the participant groups (age, type of surgery, gender, relevant underlying pathology) were extracted. The design of the study, in particular whether it was longitudinal or cross-sectional and the time points of any assessments were extracted. In addition, the stated aims of the particular studies were identified. The various constructs used to assess the relevant predictor (any measure of IPs or related constructs) and outcome variables (primarily QoL but also other relevant variables such as medical outcomes or psychological effects after surgery) were identified. These constructs were both quantitative (e.g. scores from questionnaires or medical measures) or qualitative (the result of interviews with patients). The study findings, as related to the initial aims, were extracted. From this and the other areas examined a final assessment of the quality of the individual studies methods and analysis and their conclusions were made. This data was then put into table 4.1 overleaf. The information in the table was supplemented by a more detailed narrative review of the studies that concluded by assessing how well the studies answered the question posed, this follows the table.

Table 4.1 First literature review paper details

Paper details & Participant group	**Design and aim of study**	**Measures of Illness Perceptions and other predictors**	**Outcome & other Relevant Measures**	**Study Findings**	**Paper methods and quality**
Aalto, A-M; Aro, A.R.; Weinman, J.; Heijmans, M.; Manderbacka, K. & Elovainio, M. (2006) 3130 individuals at baseline and 2650 at follow-up, all registered as being entitled with help with medication costs due to CHD At baseline 1657 males and 1473 females 45-74 yrs (mean =64yrs)	Longitudinal Quantitative Baseline recruitment and 1 year follow-up 1st aim: how IPs together with disease severity and history and sociodemographic factors are related to self-rated global health status and global QoL	Illness perceptions: IPQ subscales – identity, cure/control, consequences and time-line. Causes – IPQ-R scale + 8 items related to CHD risk Socio-demographic background: gender & yrs in	Global health status: European global health status rating (single item) QoL: Visual analogue scale	1st aim: At follow-up (controlling for baseline global health status and QoL): • no effect of sociodemographic factors; • baseline use of nitrates and CHD-related co-morbidities reported poorer global health status; • more symptoms, more severe consequences, and poorer controllability were associated with poorer global health status at follow-up over and above the CHD-related factors. • Having CHD-related physiological risk factors, poor belief in control & severe consequences	<u>Conduct of Study</u> Used established measures Research used the IPQ, IP's were related to both QoL and global health status. Both QoL and GHS were single item questions (also not distinct to cardiac issues), and there was possible overlap between QoL and global measure of health measures. Did not use physician judgments for severity <u>Analysis</u> Controlled for prior medical status, socioeconomic factors & disease severity

	2nd aim: do IPs mediate the relationships between CHD-related factors and global health status and QoL 3rd aim: do these associations differ by gender	education CHD-related factors: previous MI, previous CABG or PTCA, severity of CHD (use of nitrates, CHD-related co-morbidities, physiological risk factors)		associated with poorer global QoL. 2nd aim: • Identity, cure/control and consequences subscales mediated effect of CHD-related factors of CHD co-morbidities, physiological risk factors and use of nitrates on global health status and QoL at both baseline and 1 year follow-up 3rd aim: • No gender differences were found	Large sample led to low correlation coefficients being significant. Design Longitudinal design was used Possible sources of bias or distortion Reliance on claimant register for participants means may not identify those who did not feel need to join register or those with fewer CHD problems. Excluded all participants >74 as assumed older people would have trouble filling in questionnaires.
Stafford, L., Berk, M., & Jackson, H. J. (2009). 193 hospitalised PTCA, CABG & MI 156 males, 37	Longitudinal Quantitative Baseline 3 mths post discharge, follow up 9 mths post discharge	IPQ-R subscales: consequences, personal control, treatment control, timeline	QoL - SF-36: aggregate physical and mental QoL scores	1st aim: Baseline: greater consequences and poorer personal control were associated with greater depressive symptomatology Follow-up: baseline greater consequences predicted greater	Conduct of study Used established measures - IPQ-R but not all subscales, general measure of QoL used not specific to cardiac problems Participants recruited while still

females 38-91 yrs (mean=64 yrs)	1st aim: investigate the association between illness beliefs & depression 2nd aim: investigate the extent to which illness beliefs are associated with HRQOL	and identity	Depression – HADS Social support – MSPSS Neuroticism – IPIP-NEO	depression (poorer personal control approached significance) 2nd aim: Baseline: lower consequences and fewer reported symptoms predicted physical HRQoL; fewer symptoms and greater personal control predicted Mental HRQoL Follow-up: less chronic timeline and greater treatment control at baseline predicted physical HRQoL; fewer symptoms at baseline predicted Mental HRQoL Additionally, older age was associated with poorer personal control and poorer socioeconomic status was associated with poorer personal and treatment control	hospitalised for MI, CABG or PTCA but not assessed until 3 mths post-discharge Analysis Controlled for possible confounding variables Moderate effect sizes Design Longitudinal but short follow-up Possible sources of bias or distortion Those with depression may have decided not to participate .
Tolmie, E. P., Lindsay, G. M., & Belcher, P. R. (2006).	Cross-sectional but part of longitudinal study Qualitative	Guideline questions about life before operation:	Guideline questions about current	Four main themes identified: recovery and rehabilitation, seven years on, maintaining a positive approach, and health behaviour change	Conduct of study For qualitative work large number of participants

62 patients who had undergone CABG 7 yrs previously 52 males, 10 females 42-81 yrs (mean =64 yrs)	Aim: to look at the effects of CABG on health and well-being over time	patients' perceptions of their health and well-being, impact of cardiac problems on their lives, expectations of the outcome of the operation and its impact on their health and well-being after surgery Guideline questions about post-surgery: individual accounts about the recovery process,	health: patients' perceptions of current health and well-being and how related to their expectations, reflection of their thoughts on CABG in terms of recovery process and overall effect on their life up to this time-point	Recovery and rehabilitation: much variation in recovery experiences, with concern about pain and how would cope post discharge frequently mentioned. Others saw operation as minor interruption to daily life – particularly if had daily activities needed to return to. Most saw cardiac rehabilitation as undemanding in terms of exercise but valued the camaraderie. 7 years on: Some felt results of operation exceeded their expectations, and had a better and longer life; those who felt no benefit or a decline in QoL had low level symptoms prior to surgery or symptoms had not changed or worsened post-surgery. Majority would have operation again if could go back as it was a life saver. Many believed that emotionally they were less tolerant now than before surgery.	<u>Analysis</u> Researchers continued collecting data until all new topics were exhausted. Rigorous checks were made to ensure that the themes identified were correctly identified. <u>Design</u> As well as illness perception area the findings also covered some aspects of coping. <u>Possible sources of bias or distortion</u> As data collected 7 years after surgery recall of events prior to and shortly after surgery may not have been accurate, and due to the restricted nature of the participants the results are not

		rehabilitation services, perceptions of need for and action in making lifestyle changes		Maintaining a positive approach: Participants saw their physical and psychological well-being as inter-dependent; aimed to avoid excessive exertion and high stress. Those whose life goals had been disrupted due to surgery or cardiac problems suffered lower self-esteem and poorer psychological well-being. Denial was frequently used coping strategy for ignoring or re-attributing cardiac symptoms post-surgery. Health behaviour change: Few participants had stuck to all recommended lifestyle changes and some also avoided medication. Justified this due to contradictory advice and perception that advice frequently changing, others claimed adverse health habits too ingrained or only comfort.	

The first study to be discussed was a prospective study of coronary heart disease with a 1 year follow-up (Aalto, et al., 2006), carried out in Finland. The authors aimed to explore the associations between individual's perceptions of coronary heart disease with their global health status and QoL, and to determine whether IPs acted as a mediator in the relationship between cardiac disease measures and the global measures of health status and QoL. While a number of the participants (36% overall, 47% of males and 26% of females) had undergone CABG or PTCA, in all cases surgery was before the baseline data collection but exactly how long before baseline was unknown. All participants were analysed as a homogeneous group, therefore it was not possible to separate out those individuals who had undergone heart surgery. This may have affected the findings of the study.

Aalto and colleagues (2006) used single item measures to assess both global health status and QoL. For QoL participants were asked to place themselves on a 0-100 scale in terms of their QoL. While this approach is not an unusual way to assess QoL or health status it does not allow for the effects of participants' cardiac problems to be separated out from other health and social problems they might be experiencing, nor does it allow for the particular aspect of their QoL which is affected to be identified. For example, one individual might be in good physical health but be suffering from depression due to a bereavement and have poor social support, while another has excellent social support and psychological health but is in poor physical health due to their cardiac problems; on a single item scale both these individuals might choose the same point but their cases would be fundamentally different.

Further aims of this study were to assess whether severity of illness and demographic factors such as educational level, together with IPs, were associated with global health status and QoL, and whether IPs acted as a mediator in any relationship between cardiac factors and health status / QoL, the authors were also interested in whether there were gender differences in these associations. For the severity of illness measures the authors were reliant on self-reported use of GTN medication and current symptoms and problems to assess severity, the authors acknowledged that some of the symptoms they asked about could have been due to non-cardiac problems. Self-report data was also used to calculate educational status. For IPs the authors used a combination of the IPQ (Weiman et al., 1996) and IPQ-R (Moss-Morris et al., 2002). From the IPQ they used the illness identity, cure/control, consequences and timeline subscales. They assessed causes by adapting the causes questions from the IPQ-R by adding 8 additional items they thought relevant. Factor analysis of the cause items generated 3 subscales:

attributions to stress factors, CHD risk factors, and internal factors. Why the authors decided to use this combination of measures and not just the IPQ-R was not made clear. From the combination of constructs measured the authors generated a proposed model which is summarised in figure 4.2.

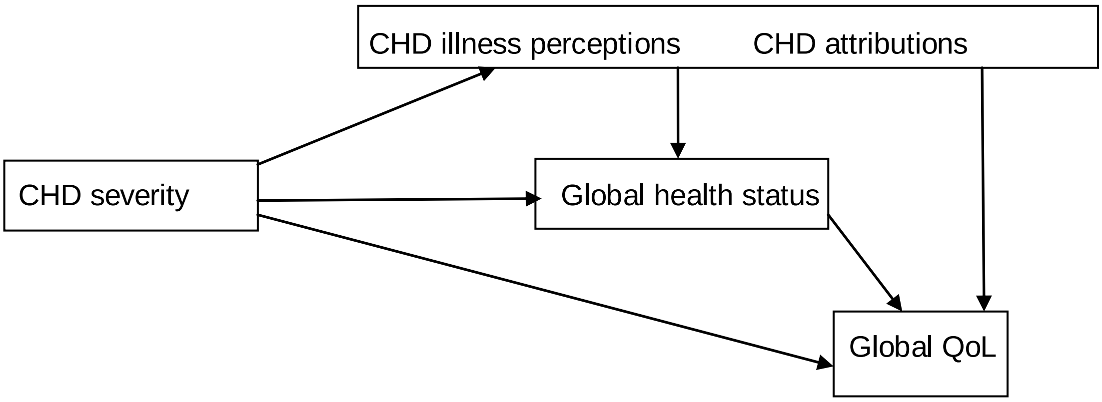

Figure 4.2 Aalto et al.'s (2006) proposed model of the predictors of global health status and QoL in those with CHD (adapted from Aalto et al. p.1312 figure 1)

Overall, this study benefits from a large sample (2650 completed a full data collection) though it did only assess a restricted age range, with those aged over 74 excluded as they might struggle to understand and fill in the questionnaires, and those under 45 due to the low general incidence of CHD in this age group; how accurate these assumptions might be, particularly for the older age group is not known. Participants were identified using a national database of those entitled to claim for help with medication costs due to on-going cardiac conditions. There is a possibility that individuals who did not desire help with their medication costs were not be on the register, which may have introduced some sampling bias, with those of a higher socio-economic status not being fully represented in the study. Due to the unequal numbers of males and females on this database, stratified sampling was used to try to establish equal gender numbers. However, a lower female response rate (as well as proportionally fewer older and more educated respondents) led to discrepancies here, with a greater proportion of males than females participants, who had a lower mean age and socioeconomic status than those who refused to take part . The authors highlighted that such a large sample could lead to significant findings being seen for relatively weak associations which was borne out by the baseline associations.

To assess the associations between the variables a series of multiple regressions, followed by structural equations modelling analysis were used. The authors found that negative IPs (more symptoms, serious consequences, and poor perceived control) were strongly associated with both poorer global health status and reduced QoL. In addition, these IPs at baseline predicted changes in both health status and QoL at follow-up, though these changes were modest. These IPs also partially mediated the effects of cardiac illness severity on global health status and QoL. Interestingly, the authors found that cardiac illness history was unrelated to both global health status and QoL, though the authors did acknowledge that their sample had stable CHD. There was also no way of knowing which, if any, of the participants had had surgery between baseline and follow up. Therefore, this study provides support for the notion that IPs can affect adjustment to cardiac conditions over time. In summary, this study benefits from using clearly defined illness perception constructs in appropriate cardiac surgery patients. The longitudinal design used also allows the effects of IPs on QoL over time. However, there are also a number of weaknesses to the study. Firstly, there was no separation out of the sample into those who had undergone cardiac surgery and those who had experienced an MI. It could be argued that having a first MI is a negative event, while for those having CABG or PTCA this procedure could be seen as “curing” their cardiac problems, as such the effect on their QoL in both the short and long-term would quite possibly be different. Secondly, there were issues around the data collected for both CHD-related items and the dependent variables of global health status and QoL. Some of the CHD-related items were reliant on self-report or assumptions made due to drug use in respect to the severity of any cardiac problems. For both of the global dependent variables a single item scale was used, these were also generic measures of well-being rather than specific to the cardiac aspects of the participants’ health. There is therefore a need to look more closely at just cardiac surgery patients and examine the changes in IPs and QoL over time and how these variables relate to each other at various points of the recovery and treatment programme.

The second study had a much smaller number of participants (n=193 at recruitment, n=184 at follow-up) of participants (Stafford, Berk & Jackson, 2009) and was a prospective, quantitative study with follow-up at 9 months post-discharge, with baseline data collection 3 months after leaving hospital after an MI or cardiac surgery; though unlike the previous study all data was collected at the same time point. The participants at recruitment were significantly younger, and more likely to be male than those who declined. The primary aim of this study was to explore the associations between IPs and depression, with a secondary aim to assess the association between IPs and HRQoL, Specifically, that negative perceptions about their coronary artery disease would predict a greater number of depressive symptoms, and secondly, that a more positive views of illness would lead to a better QoL. In additional the authors also looked at whether IPs varied with age, gender or socioeconomic status.

As with the Aalto et al. study, the participants in this study included those hospitalised for MI, CABG or PTCA. The actual numbers in each category was not reported; this was justified by the authors from previous research finding similar associations between cardiac problems and experiencing depression across MI, CABG and PTCA patients. The data collected in the Stafford et al. study was a combination of self-report questionnaires and clinical data accessed from the participants' medical records. All clinical and sociodemographic data was recorded by the hospital at the time of their admission. Some of this data was produced by the clinicians (disease severity, co-morbid hypertension and diabetes), and some was provided by the participants themselves (height and weight to calculate BMI, tobacco use, age, gender, marital status and household income levels). Two other measures were used to calculate possible confounding factors, namely measures assessing social support and neuroticism (categorised by the authors as psychosocial measures). Social support was assessed using the 12-item Multi-dimensional Scale of Perceived Social Support, and neuroticism was assessed by the 10 item subscale from the IPIP-NEO.

The IP data was derived from the IPQ-R questionnaire but only the consequences, personal control, treatment control, timeline and identity subscales were used. The lack of use of the emotional representations subscale could be explained by the fact that emotional states constituted the key outcomes of this research and were therefore separately assessed by the Hospital Anxiety and Depression Scale (HADS). This generic measure has frequently been used with cardiac rehabilitation in the UK at assess anxiety and depression.

The second outcome variable in Stafford et al.'s research was HRQoL, assessed using the SF-36. Unlike the single item measure used by Aalto and colleagues this is a multi-dimensional QoL assessor, having 8 domains: physical functioning, bodily pain, fatigue, role limitations due to physical health problems, emotional functioning, role limitations due to emotional problems, social functioning, and general health perception; and 2 aggregate scores: physical functioning (PCS) and mental functioning (MCS). While this is a widely used and reliable measure for assessing HRQoL in patients with coronary artery disease, it is still a generic measure and will not screen out any non-cardiac impacts on QoL caused by co-morbid physical or emotional problems (Dempster & Donnelly, 2000).

The extent to which IPs predicted depressive symptomology were assessed using a series hierarchical regression analyses at baseline (cross–sectional), follow up and to predict changes in outcome (both longitudinal). They controlled for the confounding effects of the sociodemographic, clinical or psychosocial (HADS depression, HRQoL, neuroticism, social support) variables. This methodology was replicated to assess whether IPs predicted HRQoL at baseline and follow up, and changes in HRQoL over this time; substituting depression with physical functioning (PCS) and mental functioning (MCS) in turn in the regression analyses.

In terms of predicting depressive symptomatology at baseline, the first block of variables (sociodemographic, clinical and psychosocial) predicted 43% of the variance with more serious IP consequences and lower IP personal control significantly improving this and adding a further 9% of variance. However neuroticism was better at predicting depressive symptomology then either of these variables. At follow up, the first block of variables accounted for 25% of the variance in depressive symptomology, with the same baseline IPs again significantly improving this and adding 10% to the variance. Again, neuroticism was a better predictor than either of these variables. When looking at the effect of IPs on changes in depressive symptomology the variables did not add significantly to the initial model, in fact the significance was explained primarily by the depression variable at baseline.

Turning to the PCS relationships at baseline, the first block of variables again significantly predicted physical QoL, but to a lesser level than depressive symptomology (22%), and lower IP identity and consequences at baseline significantly improved this, adding a further 16% of the variance. When predicting PCS at follow up the findings were similar to those for depressive symptomology, with the first block of variables accounting for 24% of the variance, and having a less chronic timeline and greater belief in treatment control significantly improving this with an increase of 11% of the variance being accounted for. In both these set of analyses the only better predictor of physical QoL was age, with older patients having a poorer PCS. As in the prediction of changes in depressive symptomatology, when trying to predict changes in PCS over time adding IPs did not lead to any significant improvement.

The final area to be considered was MCS. As with the PCS analyses the first block of variables significantly predicted MCS at baseline, follow up and also change in MCS (accounting for 49%, 37% and 48% of the variance in turn). However, in this case the addition of IPs not only significantly improved the prediction of MCS at the two time points it also significantly improved the prediction of change in MCS, though the additional variance in each case was small (respectively 4%, 6% and 4%). Looking at the individual IPs, having fewer symptoms at baseline was a significant predictor at both baseline and follow up. At baseline the other IPs predictor was personal control, implying that those individuals with a greater sense of personal control over their cardiac problems improved MCS. For the change in QoL no single illness perception variable was a significant predictor, though treatment control approached significance. In all analyses of MCS the best predictors of better MCS were not smoking and being less neurotic.

As Stafford and colleagues did not give details on the breakdown of MI to cardiac surgery patients it is not possible to discern the possible influence of such backgrounds on outcome (severity of disease is also only assessed at discharge so any changes over time of this either before or after discharge which may affect the incidence of physical or emotional problems is also unknown). The researchers themselves admit that this may have led to an unrealistic measure of both illness severity and IPs that may have affected the findings of their study.

Stafford et al. study acknowledged that individuals already suffering from depression may not have been willing to take part in the study, affecting the generalisability of their findings. This paper indicates that IPs do predict health related QoL above and beyond the effect of sociodemographic, psychosocial and disease severity factors. It should be cautioned though, that these effects could be small in the case of emotional QoL. The lack of control for baseline depression and QoL at follow up may also indicate a purely cross-sectional relationship between IPs and these outcome variables. It should also be noted that not all the dimensions of the CSM were assessed, with only part of the IPQ-R measure being given, and no measure of coping. Therefore, as the researchers themselves posit, this paper supports the link between illness beliefs and emotional responses to illness in general rather than supporting the use of the CSM in this field due to the lack of measurement of all aspects of the CSM. Overall, this paper offers some support for the role of IPs in predicting QoL after PTCA or CABG surgery but there are issues with identification of those undergoing surgery and the lack of data collection prior to this surgery.

The final paper (Tolmie et al, 2006) to be discussed in this narrative review is qualitative. As such it cannot be said to map onto the review question posed due to the nature of its qualitative enquiry; however, it was included due to its similarity of participant group to the intended research in this thesis. It used only patients who had had CABG surgery and also asked them about their experiences both before and after surgery. However, this was a retrospective study which may have led to some errors in recall, particularly with the long time span of the study (interviews were carried out 7 years post surgery). However, it does have the benefit of a substantially longer time perspective than the other two papers.

The participants in Tolmie et al.'s study were part of a larger, mixed methods study into the medical and psychological outcome of individuals undergoing CABG who were initially recruited prior to their CABG surgery. A total of 156 participants from the original study were identified as eligible to take part in this research (details of the eligibility criteria used were not given), and there was a high uptake (82% agreed to participate). The researchers used a data saturation method and did not generate any new information after they had interviewed 62 participants, so did not interview any more participants. Again, there were also more males than females (93% male) in the sample but this was representative of the proportions in the initial sample of the main study group. The authors used a standardised topic guide for the interviews. The topic areas in detail are given in table 4.2.

Table 4.2 Interview topics from Tolmie et al., 2006

Before Operation	*After Operation*	*Current Time*
An exploration of patients' perceptions of their health and well-being	Individual accounts of the recovery process	Perceptions of their current health and well-being and the extent to which their expectations had been met
The impact of cardiac disease to their lives	Views and experiences of rehabilitation services	Reflection over the past 7 years on their thoughts about the CABG operation in terms of the recovery process and its overall effect on their life
Their expectations of the outcome of the operation and its impact to their health and well-being after the operation	Perceptions of need for and action in making any changes to lifestyle	

Issues relating IPs to QoL were covered in terms of general perceptions and expectations, and the impact of the surgery. This research paper lacked a specific aim, being more an exploration of the longer term impact on health and well-being of CABG surgery from the patients' perspective. The interview transcripts were analysed using thematic analysis, with appropriate checks on analysis quality being made. Four main themes and 11 subthemes within these were identified. Summaries of these subthemes are given in table 4.3.

Table 4.3 Results of the thematic analysis of Tolmie et al., (2006)

Main Theme	**Subtheme**	**Summary of findings**
Recovery and Rehabilitation	The first weeks	Coping with immediate effects of surgery
	Resuming normal	Factors influencing how quickly they went back to normal life
	Attending class	Their views on attending cardiac rehabilitation
Seven years on	Physical well-being	How they felt their physical health had changed (or not) over the last 7 years since surgery
	Emotional and cognitive well-being	Changes in these since surgery, both temporary and permanent
Maintaining a positive approach	Stress avoidance	How they have dealt with avoiding stress where possible(seen as something to be avoided as bad for their health)
	Life goals	Goals they now aimed for, may have changed a lot since before surgery
	Acceptance and denial	Their methods of dealing with post surgical concerns, often putting their remaining symptoms down to age rather than cardiac problems
	Setting goals and finding limits	How they do this and how this has changed over time
Health behaviour change	Lifestyle change	What changes they have made
	Medication regimen	How they explained / justified their adherence (and often non-adherence) to their medication

From the information presented in Tolmie et al.'s paper it is difficult to pick out the exact information needed to assess the systematic review question and it is heavily dependent on their interpretation as reported in their discussion. However, some interesting findings can be drawn out. After the operation many participants reported emotional and / or cognitive changes which for most were temporary but persisted in others. However it was not possible to discern what the possible factors were that predicted who was at long-term risk from this paper. The researchers commented on the evidence that some participants were using maladaptive or negative coping strategies but this was not linked to other issues / comments around their IPs or QoL from these individuals, so it was not possible to assess whether this led to the posited poor psychological outcomes, attendance at rehabilitation or changes in lifestyle. The findings of the various studies will now be summarised in table 4.4.

Table 4.4 Summary of the findings for the first literature review

Study	Illness perception dimensions assessed	Links between illness perceptions & QoL made
Aalto, A-M; Aro, A.R.; Weinman, J.; Heijmans, M.; Manderbacka, K. & Elovainio, M. (2006)	Identity; cure/control; consequences; timeline; causes	Baseline poorer control & severe consequences predicted poorer QoL at follow-up
Stafford, L., Berk, M., & Jackson, H. J. (2009).	Identity; consequences; personal control; treatment control; timeline	Baseline: lower consequences & fewer symptoms predicted physical QoL; fewer symptoms & greater personal control predicted better mental QoL Follow-up: baseline less chronic timeline & greater treatment control predicted better physical QoL at follow-up; baseline fewer symptoms predicted better mental QoL at follow-up
Tolmie, E. P., Lindsay, G. M., & Belcher, P. R. (2006).	Identity; control; emotional representations	More symptoms pre-surgery or lack of change or increasing symptoms post-surgery linked to poorer QoL

Overall, although Tolmie et al.'s paper addressed relevant areas due to the nature of the study (exploratory and qualitative) it is difficult to see if there is a relationship between the initial IPs and long term outcomes. In terms of its strengths though, this paper only examines CABG patients and their views prior to this surgery and for a very substantial period after this; however, the qualitative methodology used means that the predictive role of initial IPs is unclear. It is also difficult to draw out particular dimensions of IPs from this papers information; the other papers by Aalto et al. and Stafford et al. deal with this more successfully as they both used standardised measures of IPs and QoL. It should be noted though that in neither case do they fully encompass the CSM as they do not have any measures of the behaviours generated by cognitive or emotional representations (Tolmie et al. do seem to draw out information on coping, but can only speculate on the links between this and outcome and do not relate how different IPs may generate such behavioural or emotional responses).

In terms of the participants used both the quantitative papers use a range of patients, not just those undergoing the relevant surgery (CABG or PTCA). Aalto et al. also has a large participant group which they acknowledge can lead to coincidental findings (their small yet significant correlation results appear to support their fear). Stafford et al. have fewer participants so the effects demonstrated by their findings should be less problematic but they do appear to have a strange pattern of significant relationships between IPs and emotional and QoL outcomes. Also, both these studies do not measure QoL using a cardiac specific measure. The quantitative studies also assume that the experience of MI patients will be comparable to those of patients undergoing often planned CABG or PTCA procedures. This is based on other studies (e.g. Cooper et al.; Whitmarsh et al.) that looked at the effects of IPs on attendance at cardiac rehabilitation rather than on QoL which is a different although related topic. Tolmie et al. also acknowledge that the assumption that the IPs of MI and surgery patients may be erroneous. In fact, it is unrealistic to expect them to be similar as for those undergoing planned surgery may perceive their surgery as a beneficial event as it may improve their symptoms and health, while MI patients are likely to have experienced a traumatic and unexpected event. The CABG and PTCA patients will also have had time to prepare for the surgery and been fully briefed on the possible outcomes and risks related to the surgery.

The quantitative studies discussed in this review as well as similar studies looking at the effect of IPs on rehabilitation attendance and lifestyle change are also post-MI or surgery so long-term effects of IPs cannot be fully assessed. Targeting a purely CABG and PTCA group would allow for a more carefully planned assessment of the effect of IPs prior to surgery on long-term outcome, which is a useful investigation to explore differences in outcome after such procedures. It also allows an exploration of the effects of such perceptions unfettered by the effects of a recent significant life event (such as MI), CABG and PTCA patients are eminently suitable for such an investigation due to the frequently planned nature of such interventions, implying a need for a more structured quantitative study that fully assesses the CSM and gathers information from pre-surgery through to follow-up in a sample of only surgical patients. The relationship between emotional representations and emotional regulation (using measures of coping) and how this might affect QoL has also not yet been fully explored. The next targeted literature review question will explore the links between IPs and behavioural changes in more detail.

4.2 Second targeted literature review question

The second question to be addressed by literature review was “Do IPs predict attendance at cardiac rehabilitation, or lifestyle change after cardiac surgery?” Studies were included in the review if they involved primary analysis of data (either quantitative or qualitative); included cardiac surgery patients (CABG or PTCA) as at least part of the participant group; had an outcome measure that related to attendance at cardiac rehabilitation or associated lifestyle changes (for example, diet, exercise or smoking), or if qualitative, discussion of these issues. The studies also needed to have a measure of IPs or, if qualitative, discussion of these constructs, and to be published in peer reviewed journals. In order for the content to be comprehended by this researcher they also needed to be published in English.

Studies were excluded from the review if they were unpublished, or published only in a thesis, or were a review rather than primary analysis. Studies were also excluded if the participants were under the age of 18. In addition, studies that related to non-cardiac surgery, mechanical devices, chronic heart failure, cardiac transplantation or congenital heart problems alone were also excluded. Finally, a start date of 1996 was chosen as this was the year that the first questionnaire measure of IPs was published (Weinman, Petrie, Moss-Morris, & Horne, 1996).

Four databases were chosen to perform the initial searches: Psycinfo, Web of Knowledge, Pubmed and CINAHL. The following search criteria were used when performing the searches:

Search Field 1: “Common-Sense model” OR perceptions OR cognitions OR representations OR beliefs
AND
Search Field 2: Cardiac OR “Heart attack” OR myocardial infarction” OR “Coronary artery bypass graft” OR CABG OR percutaneous transluminal coronary angioplasty” OR angioplasty OR PTCA OR “coronary artery disease” OR CAD OR “coronary heart disease” OR CHD OR “cardiovascular disease”
AND
Search Field 3: rehabilitation OR diet OR smoking OR exercise OR lifestyle OR behaviour OR behaviour

In addition, for the web of knowledge database, there was an exclusion in search field 4, “NOT computer” was used to reduce unnecessary references due to CAD representing “computer aided design” as well as “coronary artery disease”.
For all searches a start date of 1996 was selected, results in English and human participants were also used as inclusion criteria where databases allowed this. Abstracts of articles identified using these search terms were read to determine which articles fulfilled the inclusion and exclusion criteria and should potentially be included in the review, with full papers being accessed where this information was not clearly obtained in the abstract. As in the first literature review Dr Alison Wearden acted as a second reviewer of these studies, looking at 25% of the initial abstracts. Figure 4.3 shows the numbers of articles, retrieved, screened, and selected. Once the final set of articles was selected, relevant information was extracted from them, under the following headings: participant group, design, aims of study, measures of IPs and other predictor variables, outcome variables (behaviours such as smoking and exercise, attendance at cardiac rehabilitation), study analyses and findings, paper methods and quality. Initially this information was summarised in two tables, the first detailing the quantitative studies and the second the qualitative (tables 4.5 and 4.7), and then expanded upon in two narrative reviews to evaluate how the articles included addressed, or not, the question posed by this literature review. The references of the selected papers were also checked to see if other relevant papers were available, but none were found that fitted the inclusion criteria.

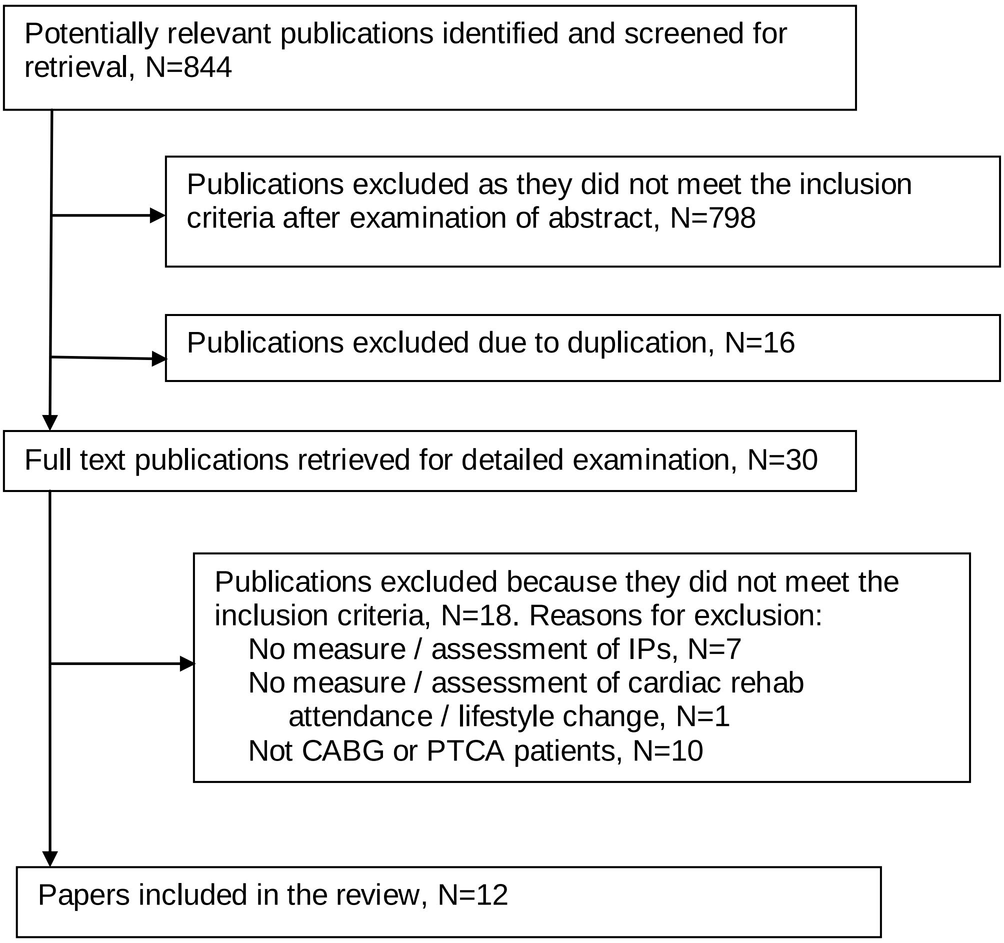

Figure 4.3 Flowchart illustrating the selection of articles for the second literature review

It can be seen from figure 4.3 above that 12 papers were included in the second literature review. Of these 5 used quantitative methods and 7 qualitative. These will now be discussed separately. As discussed earlier, the nature of qualitative research means that these studies cannot be said to directly map onto the research question set in this review but they are included to give a wider perspective of research into the links between illness perceptions and changes in lifestyle or attending cardiac rehabilitation. Summary details of the quantitative studies will now be given in table 4.5 overleaf.

Table 4.5 Second targeted literature review quantitative paper details

Paper details & Participant group	**Design and aim of study**	**Measures of Illness Perceptions and other predictors**	**Outcome & other Relevant Measures**	**Study Findings**	**Paper methods and quality**
Byrne, M., Walsh, J., & Murphy, A.W. (2005) 1084 patients took part, all registered with GPs in practices in west of Ireland and having established CHD Male to female ratio 65:35, all adults <80 yrs (mean 66 years) (demographics based on all 1611 patients approached rather than respondents alone)	Cross-sectional study design Aim: examined the extent IPs and medication beliefs were associated with variations in a range of preventative behaviours (smoking, diet, exercise, alcohol use & medication adherence)	Illness perceptions: IPQ-R all subscales Medication beliefs: Beliefs about Medicines Questionnaire Demographic information: eligibility for free medical care; marital status; educational attainment level;	Lifestyle Factors: Exercise – Godin Leisure Time Exercise Questionnaire; Smoking – current smoking status; Alcohol – 4 item scale used by WHO; Diet – Dietary Instrument	Series of hierarchical regression analyses with demographic/illness variables entered on first step, then IPs, then (for medication adherence only) beliefs about mediation. Significant predictors are reported below. Current smoking behaviour: • Younger age • Eligible for free medical care Exercise (higher levels of exercise): • Younger • Male • Fewer visits to the GP in the last 6 months • Less negative emotional	<u>Conduct of study</u> Response rate = 1084/1611 Study used established measures <u>Analysis</u> Analysis controlled for medical and sociodemographic factors <u>Design</u> Cross sectional, with data collected at one time point after surgery or CHD diagnosis (up to 7 years post diagnosis). Unable to assess whether IPs predicted change in behaviour Mixed CABG or PTCA group

		employment status; current health status (self-report) Medical record data: time since diagnosis; cardiac history (previous MI, angina, cardiac surgery); recent blood pressure and cholesterol data; current medication, any co-morbid problems	for Nutrition Education; Medication – Medication Adherence Report Scale 5	representations Higher dietary fat intake: • Male gender Higher alcohol use: • Younger • Male • Greater belief in own behaviour being a cause of cardiac problems • Less negative emotional representations Better medication adherence: • Older age • Eligible for free medical care • Believing that their cardiac problems were chronic (IPQ-R timeline) • Lower medication concerns beliefs (BMQ) • Higher medication necessity	Not analysed by cardiac category Possible sources of bias or distortion Reliance on self-report for lifestyle and sociodemographic factors GP practices identified prospective participants, may have missed some

				beliefs (BMQ)	
Cooper, A., Lloyd, G., Weinman, J., & Jackson, G. (1999) 137 individuals at baseline and all followed up 6 months later. All hospitalised due to MI or CABG, (n=64 MI, n=42 CABG, n=31 CABG & MI), 105 male, 32 female, mean age=62 yrs	Longitudinal Baseline recruitment and 6 month follow-up 1st aim: do IPs when hospitalised predicted attendance at cardiac rehabilitation? 2nd aim: are there differences in IPs between attenders and non-attenders at rehab?	IPs: IPQ subscales – timeline, cure/control, consequences, causal attributions of lifestyle and stress Socio-demographic factors: age, gender, ethnicity, marital and employment status Risk factors: Body Mass Index, know	Cardiac rehabilitation attendance (55 attended, 82 did not)	CABG and MI groups did not differ on baseline IP variables so treated as homogeneous group Attenders versus non-attenders Demographics: • Younger age more likely to attend • Currently employed more likely to attend Illness perceptions: • cure/control (stronger sense of control more likely to attend) • consequences (more severe consequence belief more likely to attend) • lifestyle causal attribution (believe lifestyle cause of cardiac problem more likely to	Conduct of study All participants participated in both assessment points Used established measures Analysis Range of possible confounding variables included in analysis Design Prospective study Large proportion of CABG patients, all participants grouped together for analysis as no significant differences for IPs and risk factors at baseline. Possible sources of bias or distortion Baseline post surgery / MI – may be measure of IPs after a

		their blood pressure, know their total cholesterol level Cardiac history: previous CABG, angina or MI Intention to attend cardiac rehabilitation		attend) Intentions: • intended to attend at baseline more likely to have attended at follow-up Knowledge of risk factors: • Attenders more likely to know total cholesterol level In logistic regression significant predictors of attendance were age, IP control and lifestyle beliefs at baseline, knowledge of cholesterol level	significant event rather than assessing effect of more long term IPs for CABG group (ie. Unable to assess effect of pre-surgery IPs). Level of attendance needed to count as an attender not specified
Leung, Y.W., Ceccato, N., Stewart, D.E., Grace, S.L. (2007) 600 patients at baseline, all cardiac in-patients, 506 retained at 9 months	Longitudinal Baseline in hospital and follow-up at 9 months and 18 months post discharge	Illness perceptions: IPQ-R subscales – timeline acute/chronic, timeline cyclical/episodic	Exercise classification: Exercise behaviour subscale of Health Promoting Lifestyle	1st aim: • exercise level 9 month follow up higher than pre-surgery and 18 month follow up • lowest pre- surgery • 18 month follow up higher than pre-hospitalisation.	<u>Conduct of study</u> Good retention rate (506/600 at 9 months;465/600 at 18 months) <u>Analysis</u> Looked at range of confounding variables such as environmental and clinical variables

follow-up and 465 at 18 months follow-up. Age range 33 to 91 yrs (mean=61), males 76%, females 24%	1st aim: longitudinal examination of exercise patterns for 18 months after hospitalisation for cardiac problems 2nd aim: examine associations between overall exercise pattern calculated longitudinally and baseline sociodemographic (e.g. age, gender), clinical (e.g. BMI, diabetes), environmental (season), and psychosocial	, consequences, personal control, curability/control lability, and cause subscale – own behaviour caused cardiac problems Other psychosocial measures: Social support (Medical Outcomes Study Social Support Survey), anxiety/ depression (HADS), exercise perceptions (Exercise	Profile used at all time points & median split used to assess whether exerciser (high score) or not. Data used to generate 3 groups for analysis – 1. Exercise maintainers – exerciser at all timepoints; 2. Inactive – non-exerciser at all	2nd aim: Apart from attendance at cardiac rehab (measured at 9 month follow up) all predictor variables were in-hospital data. • Significant correlations found between longitudinal exercise pattern and gender, family income, obesity, diabetes, smoking status, functional status, IP timeline acute/chronic, IP cause- own behaviour, exercise barriers. Significant variables entered into series of logistic regressions: Exercise maintainers more likely than inactive to: • be male • have history of exercising • have enrolled in rehabilitation • attribute cause to their own	Design Longitudinal with predictor variables at baseline and exercise at all 3 points to create exercise category Mixed cardiac group, but large proportion PTCA; not analysed by cardiac category Possible sources of bias or distortion Median split used at each time point to categorise participants as exercisers or not, classify against others in this group only

	correlates (e.g. IPs, social support)	Benefits and Barriers Scale) Clinical factors: from patient notes – type of cardiac diagnosis / procedure (coded as PTCA & catheterisation (61%) versus all other procedures – MI, unstable angina, heart failure, CABG); smoking status; selected co-morbid conditions (e.g. diabetes); from	timepoints; 3. irregular exerciser – exerciser at any time point but not 2 consecutive points All other patterns of exercise behaviour excluded from further analysis	behaviour • be a current or ex-smoker than inactive participants • less likely to perceive barriers to exercise. Irregular exercisers compared to inactive were • more likely to have enrolled in rehabilitation • less likely to perceive exercise barriers Irregular exercisers compared to maintainers were more likely to: • be current smokers • be diabetic • attribute cause to their own behaviour	

		self-report – BMI, exercise history before hospitalisation; functional capacity (Duke Activity Status); whether enrolled in cardiac rehabilitation (asked at 9 month follow-up only) Environmental factor: whether filled questionnaire in during winter (December – February, inclusive) or not			

Stafford, L., Jackson, H.J., & Berk, M. (2008) 193 participants at baseline, 156 male, 37 female, age range 38-91 yrs (mean=64), n=189 at 6 month follow up, n=184 at 9 month follow up All hospitalised for MI, CABG or PTCA	Prospective Longitudinal Aim: assess extent to which IPs predict secondary behaviour when controlling for known confounding and adherence factors Hypotheses: Higher levels of adherence to secondary prevention behaviours associated with: greater control beliefs; higher perceived	All baseline only except social desirability scale Illness perceptions: IPQ-R subscales – consequences, personal control, treatment control, timeline, causal attributions and identity Social support: 12-item Multidimensional Scale of Perceived Social Support Depression: Mini International	Adherence to secondary prevention behaviours: modified Specific Adherence Scale from Medical Outcomes Study (6 month follow up identified recommended activities and 9 month follow up assessed adherence to these)	Prediction of secondary preventative behaviours at 9 month follow up: • Predictors other than IPs were significant • IPs added 6% of variance. Only consequences was significant predictor added about 2% of unique variance. Control and illness identity not associated with adherence – only partial support for hypotheses	Conduct of study Low attrition rate (184/193 at second follow up) Used established questionnaires Analysis Controlled for psychosocial, demographic, clinical and social desirability variables Design Prospective study, data collected baseline, 6 months & 9 months Mixed cardiac group Not analysed by cardiac category Possible sources of bias or distortion Reliant on self-report for secondary behaviour data Demographic data indicated possible sample bias

	consequences; greater illness identity	Neuro-psychiatric Interview Version 5 Social desirability scale from Medical Outcomes Study used at 9 month follow up only Clinical data: disease severity measured using left ventricular ejection fraction (LVEF); BMI; family history of CAD; tobacco and alcohol use; prior history of depression – derived from hospital notes			

		Socio-demographic data: Age, gender, marital status, yrs of formal education			
Yohannes, A.M., Yalfani, A., Doherty, P., & Bundy, C. (2007) 193 patients starting 6 week CR programme in UK (129 male, 60 female), 42 dropped out (20 male, 22 female) Mean age completers =61 yrs, drop outs = 59 yrs All had MI, some CABG or PTCA after	Longitudinal Data collected prior to start of CR and attendance monitored Aims: report the prevalence of early drop out; investigate if this could be predicted by differences in IPs, sociodemographic	Socio-demographic information: age, gender, diagnosis group (MI, CABG or PTCA) Psychological state: HADS Illness perceptions: IPQ-R all subscales	Attendance at CR: completers attended all sessions, non-completers those who dropped out after 4 or fewer sessions	Differences in drop out according to MI or CABG, 69% of MI patients dropped out versus 14% of CABG patients. Logistic regression found more likely to drop out if: • younger • female • high scorer on HADS • lower consequences • higher personal control • lower treatment control	Conduct of study High completion rate for cardiac rehab (151/193) Used established, cardiac relevant questionnaires Analysis Controlled for socio-demographic, psychosocial and QoL variables Design Longitudinal, data collected pre and post cardiac rehab High proportion of CABG patients

this	data, psychological distress or QoL	Quality of life: QLMI			Possible sources of bias or distortion All participants started a cardiac rehab programme so findings not generalisable to general cardiac group

The authors of the first study (Byrne, Walsh & Murphy, 2005) explored associations between IPs, as measured by the IPQ-R, and secondary health behaviours (smoking, exercise, diet and alcohol consumption). A secondary aim was to explore associations between beliefs about medication and medication adherence. Participants were a mixed group, with the exact numbers who had undergone CABG or PTCA unclear, as while 438 of the entire cohort of 1611 patients initially identified as potential participants had undergone CABG or PTCA, the numbers in the 1084 who returned questionnaires were not given. Additionally, the patients were treated as a homogeneous group, so any possible differences between patients who had undergone an MI, CABG, PTCA or merely suffered from angina in terms of IPs were not explored. This was a cross-sectional study.

All participants were drawn from general practitioners lists, with data after surgery. The length of time from surgery to data collection was not given, merely a length of time from diagnosis with coronary heart disease (mean of 7 years). 69% of potential participants completed the questionnaire pack. This assessed lifestyle factors, demographic information, and illness and treatment perceptions. The lifestyle factors included exercise behaviour, smoking status, alcohol consumption, dietary habits and adherence to medication. Exercise was assessed using the Godin Leisure Time Exercise Questionnaire, a self-report measure of the frequency and vigorousness of physical activity, which generates a weekly score. The smoking assessment asked participants if they were a current, former or non-smoker. Alcohol consumption, levels of dietary fat, and adherence to medication were also assessed via self-report.

IPs were assessed by the full IPQ-R. The authors used the participants' responses to the open question at the end of the IPQ-R cause section which asks people to identify the 3 most important causes of their cardiac problems, rather than carrying out a factor analysis. The most important cause for each participant was identified and coded into one of three categories (stress, hereditary/biological factors or lifestyle). It is possible that factor analysis would have revealed a different set of factors in this population. The rationale for using such a method classifying causal beliefs was not given by the authors.

Treatment perceptions were measured using the Beliefs about Medicines Questionnaire (BMQ), an established questionnaire to assess treatment perceptions which is grounded in the CSM and assesses beliefs about specific prescribed medications and medications in general. Specific medication beliefs include beliefs about how necessary and effective prescribed medication is (medication necessity) and beliefs about potential harm (medication concerns). General medication beliefs include beliefs that medicines in general are overused by doctors (medication overuse) and beliefs on whether medicines are generally harmful (medication harm).

Descriptive details given of the 1611 patients originally identified stated that 85% of participants had been diagnosed with angina, about 50% had had an MI, 19% had undergone CABG and 13% PTCA. They were frequent attenders in primary care; though when asked to rate their own health, 54% rated it as either good or very good. This may have had bearings on the IPQ-R data as the good subjective health ratings suggest that participants may not have been experiencing many symptoms at the time of study. A major omission in the data collected from the patients or their medical notes that would be relevant to this study is whether the participants attended cardiac rehabilitation or not, as this may have influenced their decisions on practicing secondary preventative health behaviours such as those being examined in this study. In order to look at the associations between illness and treatment perceptions and the behavioural outcomes, hierarchical logistic and linear regression analyses were used. In all analyses possible contributing medical and demographic variables (age, socioeconomic status, previous MI, time since diagnosis and number of GP appointments in the previous 6 months) were controlled for. IPs were entered separately as were the BMQ variables.

Looking first at smoking, the significant predictors were age and socioeconomic status, with smokers being younger than other participants, and more likely to be eligible for assistance with medical costs. Adding post-surgery IPs contributed little to the variance predicted, with none of the IPs being predictive of smoking status post-surgery. Similar small effects for IPs were shown for the other analyses as well; for exercise the demographic variables accounted for 8% of the variance in exercise scores, with significant predictors being age, gender, and number of GP consultations in the previous 6 months. Adding IPs added a small but significant amount to the model (2% of variance), but only emotional representations were independently predictive of exercise from this second set of variables; patients with less negative emotional representations were more likely to exercise. This finding might at first sight seem to be contrary to predictions from the CSM which suggests that cognitive representations of illness should drive behaviours to deal with the threat posed by the illness, while emotional representations drive emotion regulation strategies. However, given that this was a cross-sectional study, the authors posit that this finding may be due to the known effects of exercise boosting psychological well-being, rather than the other way round. Additionally, it may be the case that exercise was being performed or maintained, at least in part, as an emotion regulation strategy.

None of the IP variables were predictive of dietary fat intake, with gender the only independently predictive variable (males consuming more fat). Demographic variables predicted 8% of the variance in the alcohol consumption score, with being younger, male and having fewer GP consultations being independent predictors. Adding IPs added a further 2% to the variance accounted for, which was significant. Once again, only emotional representations were an independent predictor of alcohol consumption, with those with less negative emotional representations drinking more. The latter finding would seem to indicate that patients were not using alcohol consumption as a coping strategy.

Older age and being eligible for help with medication costs were independent predictors of improved adherence to medication. Adding IPs did not increase the overall variance accounted for, but a higher timeline score was a significant predictor of medication adherence. Adding medication beliefs to the regression resulted in an increase in variance in adherence accounted for of 7%. The significant treatment belief predictors were specific beliefs about cardiac medication being necessary and having fewer concerns about cardiac medication.

In this study overall IPs had only a weak predictive effect, being responsible for no more than 3% of the variance in any of the behaviours looked at. The authors suggest that this is because cardiac diseases differ from other chronic illnesses as individuals with such conditions do not seem to be as aware of the severity of their condition as those individuals with other chronic conditions. This is backed up by fact that many of participants rated their health as excellent even when they had experienced a severe cardiac issue within last 10 years, and many of them had a current diagnosis of angina. In addition their identity scores were low and it is known that having identifiable symptoms is important in forming cognitive representations about a condition or illness. In addition, not experiencing very many current symptoms may mean that participants did not feel a need to practice preventative behaviours.

This study illustrates the need to examine different stages in the experience of cardiac problems. The study used participants with established CHD who were managing their condition well. Patients referred for surgery are likely to be suffering from angina with worsening symptoms; such individuals are likely to have very different IPs from those with more stable CHD. The timing of measurement may also be very important. In this study we only know that patients were post-surgery, but time since surgery was not taken into account. It is conceivable that IPs alter post surgery and then change again as time goes by, therefore the participants in this study who all had established CHD may well have had diverse IPs due to the variable time since their MI or heart surgery which may have affected the findings .

The role of emotional representations in this study is interesting, with lower scores being linked to greater alcohol consumption and more frequent exercising. With respect to alcohol consumption, the authors suggest more pessimistic individuals may have a more realistic view of their cardiac problem and so change their behaviours for the better; however, to be fully consistent with the CSM, one would expect negative emotional representations to be associated with more pessimistic cognitive representations and for these latter representations to drive behaviour change. This was not found. Overall, the major problem for this study in relation to the systematic review is the cross sectional nature of the study and the variance in the timing of data collection with respect to surgery. The authors acknowledge this problem and suggest a need for longitudinal research. It should also be noted that the CSM posits that emotional representations drive emotional regulation but no measure of emotional regulation was used in this study.

Turning to the second quantitative study, Cooper et al (1999) carried out one of the earliest investigations into the effect of IPs on attendance at cardiac rehabilitation. The study assessed whether IPs (measured using the original IPQ) of individuals who were currently hospitalised after MI or CABG predicted attendance at rehabilitation. As a secondary aim, possible differences in perceptions of attenders and non-attenders were also explored. Data were collected in the hospital soon after surgery or MI, with follow up 6 months later. Participants were a combination of MI patients (n=64), MI patients who had undergone a CABG (n=31) and patients having a planned CABG procedure (n=42). Comparison of the baseline information on these groups of patients found no between group differences at baseline on IPs, and the data was amalgamated into a single group for analysis.

In addition to demographic and IPQ data, patients provided the following whilst still hospitalised: knowledge of personal risk factors (BMI, blood pressure, cholesterol level, smoking status, previous exercise); whether they had a history of heart disease (angina, previous MI or CHD diagnosis 4 weeks or more before they were admitted to hospital); and their intention to attend cardiac rehabilitation after discharge. All participants were followed up 6 months by post or telephone and asked whether they had attended cardiac rehabilitation. These methods and the nature of the data collected raise some issues to be taken into account when interpreting the data. Firstly, the timing of the data collection is when all individuals have just had a relatively traumatic experience (either MI or CABG). As such any IPs may be altered by surgery and during the recovery process and hence differ from pre-surgery perceptions about their cardiac problems. This may explain the lack of differences in IPQ scores for the 3 groups at baseline. While this is not necessarily a problem for this particular study, it is necessary to be aware that pre- and post-surgery IPs may differ.

Secondly, it appears from the paper that all the data collected is self-report data. While hospital records may not necessarily be more accurate, it would have been preferable to have both self-report and hospital records, so that the two sets of data could be compared. In addition, there is no detail of what attendance at cardiac rehabilitation involved in terms of number of sessions. As this paper is concerned with identifying factors that predict attendance, due to the perceived need to try and boost attendance, this is a sizeable oversight.

When the participants were followed up 55 (40%) stated that they had attended rehabilitation while 82 (60%) had not. Attenders were generally younger, employed, more likely to know their cholesterol level, and more likely to have stated their intention to attend while in hospital. In terms of IPs, attenders were more likely to see their condition as controllable, having severe consequences, and more likely to attribute their cardiac problems to their lifestyle. In logistic regression, participants' age, knowledge of cholesterol level, belief in the controllability of their condition, and belief in lifestyle causes for their condition were significant independent predictors of attendance at rehabilitation. The strength of this study is in its prospective nature. However, it does not assess the role of pre-surgery IPs in surgery patients which may be more interesting when exploring factors that predict attendance at rehabilitation as they could be easier to modify than those after the trauma of surgery.

A study carried out in Canada (Leung et al., 2007) focused on predicting exercise behaviour in individuals with CHD following hospitalisation for cardiac problems. The study aimed to carry out a longitudinal examination of exercise patterns in the 18 months after discharge from hospital (data collected in hospital, 9 months post-discharge and 18 months post-discharge), and secondly, to examine associations between these exercise patterns and socio-demographic, clinical, environmental, and psychosocial variables, including IPs all collected while the patient was in hospital.

This study included patients who had suffered an MI, or undergone PTCA or CABG. No exact breakdown of participants by diagnosis group was given, but in a related paper (Grace, Leung & Stewart, 2008) it is revealed that 405 (61%) of the 661 participants had undergone a PTCA, with no further differentiation into CABG or MI patients. At 18 month follow up 290/465 (62%) of the remaining participants were PTCA patients. Rather unhelpfully, for analysis purposes, unstable angina, heart failure, MI and CABG participants were grouped together, in order to form a group of roughly equal size to the PCTA group, rather than for any theoretical or clinical reason.

The authors used the IPQ-R, but only those subscales which had appeared in the earlier version, the IPQ, leaving out the illness coherence, treatment control and emotional representations subscales. The rationale for excluding some of the subscales was not made clear. It is possible that the authors excluded the emotional representations because they were interested in the predictive power of cognitive representations, although they did not specify this. Only one cause measure was used in the analyses, that being the extent to which patients attributed their condition to their own behaviour. Other psychosocial measures assessed social support and perceptions of barriers to exercise.

Possible socio-demographic and clinical predictors of exercise behaviour were also collected via questionnaires and inspection of medical notes. A single item was used to assess attendance at rehabilitation. Again there may be issues over whether enrolled in rehabilitation implies attending multiple sessions, a single session or merely agreeing that they might attend when asked. Finally participants stated when they were filling in their questionnaire, with completion in December, January or February being coded as winter and all other months as non-winter. This was a particularly useful idea, given the adverse weather likely to be experienced during these months in Canada, which might have affected the ability of the participants to exercise, however patterns of exercise behaviour were not differentiated by time of year.

Exercise behaviour was assessed on 4-point Likert scales (1=never, 2=sometimes, 3=often, 4=routinely) relating to 8 different exercise behaviours, and then combined to form an overall score, at baseline and both follow-up points (9 months and 18 months post-discharge). The median overall exercise score was then used to split the respondents into 2 groups, deemed exercisers and non-exercisers. The data across all 3 time points was then used to categorise individuals as follows:

Exercise maintainers – rated as exercisers at all time points

Inactive – categorised as non-exercisers at all time points

Irregular exercisers – classed as an exerciser at least 1 point, but not 2 consecutive points.

The method used to classify people into the exercise categories has inherent problems. For example, individuals who increased their exercise across the time points may still be classed as inactive if they remained below the median level, while those who decreased exercise could nevertheless stay in the exercise maintainer category. Also the classification does not take into account the absolute level of exercise, just that relative to the sample as a whole. The authors acknowledge the possible difficulties with their classification system and admit it may explain why they have a higher proportion of exercise maintainers than other studies. As a further consequence of using this categorisation process only 377 of the sample were retained for the relevant analysis, with 284 participants being excluded as they did not fit into any of the above categories.

Initial analysis of the overall pattern of exercise using the median split categorisation into exerciser or non-exerciser across all 3 time points, found that exercise levels were at their lowest pre-hospitalisation (as reported by the participants in their baseline questionnaires), and significantly higher at both follow-up points, with the highest levels being reported at the 9 month follow-up point. For the second set of analyses ANOVA and chi-squared tests were used to compare the three categories of exercise behaviour on the predictor variables derived from the in-hospital questionnaire and with enrolment at rehabilitation. Significant associations with exercise categorisation were found for gender, family income, obesity (BMI >30), co-morbid diabetes, having exercised prior to hospitalisation, enrolment at cardiac rehabilitation, smoking status, functional status, perceptions of barriers to exercise, and the IPs subscale of timeline chronic/acute and the own behaviour cause subscale item. These significant variables were then entered into a series of logistic regressions.

Logistic regression found that, compared with inactive participants, exercise maintainers were significantly more likely to be male, have exercised prior to hospitalisation, to have enrolled in rehabilitation, were less likely to attribute the cause of their illness to their own behaviour, to be a current or past smoker, or to see barriers to exercise. Secondly, compared with inactive participants, irregular exercisers were more likely to have enrolled on rehabilitation, and less likely to perceive barriers to exercise. Finally, compared with irregular exercisers, the exercise maintainers were less likely to be current smokers, have diabetes or to attribute their illness to their own behaviour.

This was a long-term prospective study, which considered a wide range of predictive factors to explain exercise behaviours. There were a large number of participants and the authors reported a high retention rate, however, those who remained with the study were the higher scoring exercisers at each previous time point, indicating drop-out bias. The categorisation of exercise behaviours may also not have been sensitive to smaller changes in individuals' exercise levels. The participant group contained a high proportion of individuals who had undergone a PCTA, but the number of CABG patients is unknown. At no time was the data fully split to show findings for the various diagnostic categories. As individuals were identified once in hospital, it is likely that initial data were collected post-surgery or MI, but this is unclear from the information given. The only IP variable which was predictive of exercise behaviour was a single item from the IPQ-R cause subscale, that the participant attributed the cause of cardiac disease to his/her own behaviour. However, this finding is in line with previous work (for example, Weinman et al., 2000). Interestingly, those individuals who seemed more likely to attribute their cardiac problems to their own behaviour were less likely to be regular exercisers at follow up, indicating that merely acknowledging responsibility is not enough to change behaviour. Alternatively, it could be that participants attributed their cardiac problems to aspects of their behaviour other than lack of exercise. Added to the data from the previous study by Byrne et al. (2005) the Leung et al. study appears to indicate a low predictive quality of IPs for lifestyle changes in cardiac patients. However, these findings may partly be an artefact of the multiple areas also encompassed as predictors in this research, indicating a need for a more simplified investigation while still exploring other factors that may predict lifestyle behaviours.

The fourth quantitative study (Stafford et al., 2008) examined whether IPs in recently hospitalised cardiac patients predicted changes in lifestyle behaviours. Again, this was a prospective study with follow-ups up to 9 months after discharge from hospital. While participants were identified in hospital they were recruited 6 weeks after discharge and completed their baseline questionnaires 3 months after discharge. All participants had undergone either a PTCA or CABG while in hospital.

Stafford and colleagues hypothesised that higher levels of secondary preventative behaviours would be associated with greater beliefs in control over cardiac problems, greater perception of the severity of the cardiac condition, and reporting more symptoms. Six of the 9 subscales of the IPQ-R were used: identity, consequences, personal control, treatment control, causes and acute/chronic timeline. The three causes participants rated as most important in causing their cardiac problems were categorised into stress, hereditary / biological factors, or lifestyle, however 27 participants did not fill in the open question section, or gave answers that did not fit into one of these categories. This supports support for the point already made for the previous study that using the responses for the 18 cause questions would have been more relevant.

Social support was assessed by questionnaire at baseline while depression was assessed via a clinical interview conducted by telephone at the same time the questionnaire pack was sent out Socio-demographic information (age, gender, marital status, years of formal education) was also collected at baseline, and a measure of social desirability collected at the second follow-up point (9 months post-discharge). Clinical risk factors including illness severity (left ventricular ejection fraction data from the participants' medical records during hospitalisation), the presence of diabetes or high blood pressure, BMI, family history of depression and depression, alcohol use and tobacco use were also obtained.

To assess secondary behaviours a two part method was used. At the 6 month follow-up participants were asked to indicate which behaviours (exercise, medication adherence, diet, alcohol consumption and smoking behaviour) they had been advised to modify, and at the 9 month follow-up how often they had carried out the recommended behaviour. An average across all their recommended behaviours was calculated to indicate overall adherence. This had the advantage of constructing a personalised set of data for each individual, rather than looking at generic behaviours as in other studies. However, the measure was dependent on the individual correctly reporting not only which behaviours they should perform, but also the frequency with which they were performing them. By averaging across all the behaviours improvements in only one or two behaviours may have been masked, so looking at individual behaviours might have been more useful.

The authors justified their use of the 3 months post-discharge as their baseline, to avoid any confounding effects of acute illness and stress due to the surgical procedure undergone. It could be argued that it would be useful to measure IPs at an earlier stage, that is, pre-surgery in order to improve the prediction of lifestyle behaviours long-term and develop early interventions to promote lifestyle change.

The authors also examined how well the participants understood the risk factors that had led to their cardiac problems. They compared responses on the IPQ-R cause subscale with the risk factors identified in the patients' medical records. Analysis using either t tests or chi- square analysis found concordance between risk factors from their medical records and participants' responses on the cause subscale for smoking, alcohol consumption, depression and hereditary variables. Being over 65 at surgery was not found to be linked to a belief in ageing as a cause, and while there was a trend for those with a BMI over 25 to see their diet as a cause, this was not significant. The greatest agreement was found for family history (83% of those with a family history of CHD saw heredity as a cause of their problems), followed by smoking (74% of smokers saw smoking as a cause), and alcohol (35% of those who consumed greater than the recommended alcohol levels saw alcohol as a cause).

In order to assess the main hypotheses a hierarchical regression was carried out. The possible "confounding" variables (age, years in education, disease severity, depression, social support and social desirability) were entered first, with IPs being added afterwards. The confounding variables were a significant predictor of secondary behaviours, explaining 16% of the variance; adding IPs added 6%. The most important predictor was social desirability, followed by age. The only IPQ-R variable which was an independent predictor of secondary behaviour was consequences; with a greater perception of the consequences of cardiac illness being linked to greater adherence to recommendations (explaining 2% of the variance). Therefore, the authors' hypotheses are only partially supported, and, as in the previous studies the role of IPs is only slight even in a more homogenous group of CABG and PTCA patients. Once again the issue of timing of measures may be important, with baseline data 3 months post surgery While this timing means that the short term effect of surgery is not interfering with the individuals' perceptions, as IPs are dynamic it is possible that improvements in symptoms after surgery may have been associated with temporary changes in IPs. The authors recognise that the individuals’ identity score at baseline was low which supports this assertion.

The final quantitative paper (Yohannes et al., 2007) examined the role of IPs, sociodemographic factors and distress in predicting cardiac rehabilitation programme drop out. The full IPQ-R, the Hospital Anxiety and Depression Scale, and the Quality of Life after Myocardial Infarction Questionnaire were used to assess IPs, distress and QoL. Data were gathered on procedures prior to rehabilitation, gender, age, marital status, smoking status, occupation and education level

All of the participants were recruited from a single site and due to attend the same 6 week rehabilitation programme. A total of 189 participants took part; of these 82 had experienced an MI alone, 74 an MI followed by CABG, and 33 an MI followed by a PTCA. As in all cases the cardiac surgery was preceded by an MI means that these may not have been planned procedures and it cannot be certain whether patients had been living with known cardiac problems prior to their MI or not. The completion of cardiac rehabilitation (defined as having attended all sessions) was high at 78%. Participants were recruited prior to the start of cardiac rehabilitation and returned their questionnaires at the first session; implying that they were recruited once they had decided to attend rehabilitation. Therefore, the high rehabilitation completion rate is not unexpected, as all participants were individuals who had a strong intention to attend the programme.

The authors classified non-completers as failing to attend after the first two weeks of the programme so the small number of non-completers are those who merely attended that first session and did not return. This methodology means that the findings of this study cannot be directly compared to studies such as that by Cooper, which looks at the role of IPs in predicting rehabilitation attendance in individuals still in hospital; in addition, the late recruitment of participants means that the study findings have importance in identifying individuals who may drop out of rehabilitation once they have committed to it, but are not able to provide guidance on who may not attend prior to this.

Females were more likely to drop out and there was a trend for non-completers to be younger. Psychological distress (HADS) was significantly greater in non-completers. In terms of IPs, completers were more likely to see their problem as more long term, to have more severe consequences, and feel a poorer sense of personal control but a greater sense of treatment control. This may indicate that they felt that rehabilitation was needed as they had been referred after hospitalisation, and as such it was an extension of their treatment. The identity scores were significantly higher in the non-completion group, implying higher levels of symptoms may be a barrier to attendance. Those with an MI only were more likely to drop out and those who had a CABG were most likely to complete rehabilitation. Looking at the genders separately females who dropped out had significantly higher levels of psychological distress (HADS), and lower perceived consequences. For males, there were no significant differences found between completers and non-completers.

In order to assess the second aim hierarchical logistic regression analysis was carried out. Drop out was predicted by younger age (3% of variance), female gender (3%), higher psychological distress (14%), less severe perceived consequences (10%), higher belief in personal control (2%) and lower belief in treatment control (7%). Overall, this model accounted for a very high 41% of the variance in drop-out rate. The findings of this study are similar to others in this area, with a greater drop-out rate amongst females and key IPs being associated with drop-out. The authors posit a number of reasons for the gender differences, including the effect of a male dominated rehabilitation programme being off putting, and the differing roles in males and females affecting beliefs on the importance of rehabilitation but admit this needs further exploration. In terms of the IP findings this paper provides support for the importance of control and consequences beliefs on rehabilitation attendance, and to a lesser extent the role of symptom levels. However, the authors concede that the single data collection point is a limiting factor of the research, and also suggest that there is a need to look at other confounding or contributing factors such as coping strategies used by participants. Before moving on to the qualitative papers it is useful to summarise the findings of the quantitative studies. This is done in table 4.6 overleaf.

Table 4.6 Summary quantitative findings of the second targeted literature review question

Study	**Illness perception measure**	**Behaviour(s) investigated**	**Significant illness perception predictors**
Byrne et al. (2005)	IPQ-R	Smoking	No effect
		Exercise	Emotional representations
		Dietary fat	No effect
		Alcohol consumption	Emotional representations
		Medication adherence	Significant but no independent IPQ-R predictors
Cooper et al. (1999)	IPQ subscales: timeline, cure/control, consequences, causal attributions of lifestyle, stress	Attendance at cardiac rehabilitation	Controllability and lifestyle attribution
Leung et al. (2007)	IPQ –R subscales: timeline acute/chronic, timeline cyclical/episodic, consequences, personal control, attribution of own behaviour	Exercise behaviour	Attribution of own behaviour differentiated between exercise maintainers and others (also significant correlations between exercise behaviour and timeline acute/chronic also)
Stafford et al. (2008)	IPQ-R, not emotional representations subscale	Adherence to recommended preventative behaviours	Consequences
Yohannes et al. (2007)	IPQ-R	Completion of a cardiac rehabilitation programme	Consequences Personal control Treatment control (differences between completers and non-completers also for timeline acute/chronic, identity)

Table 4.6 shows some consistency in the role of IPs for attendance or completion of cardiac rehabilitation but the role of IPs in predicting lifestyle behaviour change is more variable. This may be due to the different lifestyle behaviours studied or the different assessment time points used. It should also be noted that for studies other than Yohannes et al. (2007) the effects of IPs is only minor. In all cases the data was collected after the participants had undergone surgery but at a range of time points, therefore inconsistencies in the findings are not unexpected. Next, the summary of the qualitative papers included in this review will be given. These can be seen in table 4.7.

Table 4.7 Second targeted literature review qualitative paper details

Paper details & Participant group	**Design and aim of study**	**Measures of Illness Perceptions and other predictors**	**Outcome & other Relevant Measures**	**Study Findings**	**Paper methods and quality**
Darr, A., Astin, F., & Atkin, K. (2008) 65 participants, discharged from hospital in last year after treatment for unstable angina (32%), an MI (42%) or CABG (26%) 20 Pakistani- Muslim (mean age 59 yrs), 12 Indian-Sikh (mean age 63 yrs), 13 Indian-Hindu (mean 63 yrs), & 20 European (mean 66 yrs)	Retrospective Aim: examine and compare beliefs of UK South Asian and European individuals on beliefs about causes of their illness and lifestyle change	Topic guide questions on: understanding of condition journey through the healthcare system (identification of cardiac issues) impact of heart disease on lifestyle and relationships	Topic guide questions on: journey through the healthcare system (health and lifestyle advice) efforts to regain good health/ prevent further problems	Variation in participants' experience of diagnosis and the explanations received from health professionals. Uncertainty about causes, led to lack of behavioural change in some cases Confusion over coronary risk factor knowledge, especially role of family history. Stress seen as cause by around half of entire group South Asian participants more likely to say did not know cause of problems than Europeans	<u>Conduct of study</u> Study used a large participant group for quantitative analysis. Good range of South Asian backgrounds covered. High response rate (83%) <u>Analysis</u> Used checking procedure to ensure quality of analysis <u>Design</u> Retrospective (approx 1 year post-surgery) so recall may be a problem

				South Asians more likely to see their diet as problematic than Europeans but had greater problems altering their diet Not clear if the intention to change behaviour had actually led to behaviour change	<u>Possible sources of bias or distortion</u> Did not differentiate between attenders and non-attenders at rehabilitation so not possible to assess whether beliefs about secondary behaviours due to rehab or other sources
Lin, Y., Spilsbury, K., Furze, G., & Lewin, R.J.P. (2009) 16 patients recruited from a cardiovascular ward & 5 outpatient clinics in Taipei, Taiwan 12 had PTCA and/or PTCA, 12 males, 4 females, age range 42-75 yrs (mean=62)	Retrospective Used framework analysis 1st aim: explore Taiwanese people's beliefs and experiences of heart disease 2nd aim: explore possible misconceptions / maladaptive beliefs about heart disease	Semi-structured interview using topic guide. Question areas: Illness experiences and beliefs, perceptions of heart disease, Understanding of their condition, appraisal and disease	Questions around chosen coping behaviours (e.g. diet and lifestyle changes)	1st aim Symptom perception: reported range of indicators of heart problems, often not what expected so attributed to non-cardiac causes Control: all believed heart problems chronic and long term, no cure but manage with medication. Link between lack of control, increased perception of severity and increased anxiety / fear felt. Feeling better: Cognitive appraisal of current health in terms of outcome / current symptoms. Emotional appraisal in terms of avoiding stress or excitement. Some who had changed	<u>Conduct of study</u> Topics based around Leventhal's CSM <u>Analysis</u> Range of methods used to ensure quality of analysis <u>Design</u> Large proportion of CABG/PTCA patients (12/16) Retrospective

	3rd aim: explore maladaptive coping behaviours	processes		diet or lifestyle only did so until felt better then stopped. 2nd aim Causal attribution: multiple causes, common were unhealthy lifestyle and stress. Some older participants attributed to old age 3rd aim Protecting the heart: most common strategy medication and attending follow up appointments but 15/16 reported maladaptive coping – avoidance of possible stress/excitement by over cautious response. Less than 50% exercised regularly or ate healthily.	<u>Possible sources of bias or distortion</u> Cultural restrictions on verbalising emotional distress which may have affected this aspect.
Ononeze, V., Murphy, A.W., MacFarlane, A., Byrne, M., & Bradley, C. (2009)	Retrospective Used Grounded Theory Primary aim: to	Three open-ended questions asked about: cardiac event or history; life	Some content derived from later focussed	Primary aim: derived the theory of “keeping it going”. Three inter-related components: • making sense and coming to	<u>Conduct of study</u> Used efficient sampling method to ensure wide variation in sample general practices.

26 patients with diagnosis of angina or MI recruited from GP practices in west of Ireland 16b males, 10 females, mean age =68yrs	describe the development of a Grounded Theory of individual experiences of heart disease Secondary aim: to consider the usefulness of such a theory in secondary prevention	world; and cultural significance of heart disease. Later interviews added more focused questions derived from responses of earlier interviews, e.g. causes of their cardiac problems	questions, e.g. self-care strategies	terms with illness (e.g. symptoms) • understanding and learning to live with illness (e.g. regaining control) • managing everyday life with illness (e.g. lifestyle changes). Led to dynamic experience of cardiac disease. Secondary aim: applied sociocultural framework to the model to look at effect on secondary behaviours. Led to 3 inter-related explanatory concepts of such behaviours 1. Knowledge, beliefs, and attitudes to health care (incorporating illness and treatment perceptions concepts as well as attitudes towards preventative behaviours) 2. impact of health and social	Analysis Strong analytical basis described Although applied model to secondary behaviour did not give much detail on how this was done Design Lack of detail on actual questions asked Not known exactly how many PTCA /CABG patients Possible sources of bias or distortion Did not manage to find patients who reported difficulties living with cardiac problems (may be possible over-positive view underpinning model.)

				interactions (social and health professional networks) 3. Implications of cardiovascular health policies (availability of services, professional factors).	
Page, M., Jackman, K., & Snowden, P. (2008) 11 patients recruited from a coronary care unit in Brisbane, Australia all undergoing PTCA 8 men, 3 women (No other demographic data collected)	Retrospective Used Grounded Theory and Framework Analysis Primary aim: investigate if patients who had recently undergone PTCA saw any gaps in their care / support from health professionals Secondary aim: an exploration of	No details on interview questions given	No details on interview questions given	5 themes emerged after analysis: • misconceptions about causes of their condition • overall did not find undergoing PTCA stressful • two procedures close together caused concerns • reported pain after removal of sheath from artery • lack of post discharge advice and support (included views on intention to attend cardiac rehabilitation, most seemed ambivalent and not encouraged to go by medical professionals)	<u>Conduct of study</u> All interviewed in own homes, possibly more relaxed and open. <u>Analysis</u> Used appropriate analysis <u>Design</u> Retrospective Not covered all aspects of IPs - only causes and did not try to link these beliefs with attendance for individual patients at CR or lifestyle change. <u>Possible sources of bias or distortion</u> Interviews carried out by cardiac

	any benefits felt from cardiac rehabilitation and / or education and identification of any further unmet needs				nurses, their own beliefs may have affected interviews
Plach, S.K., & Stevens, P.E. (2001) 15 women who had recently had heart surgery (PTCA or CABG) Field note data collection (n=13) age range 51 to 66 years (mean age =59) In-depth interviews (n=2), ages 47 and 61 years	Retrospective study using content analysis Aim: to describe the experiences of middle aged women with heart disease after cardiac surgery	Field notes based on observations and conversations during service delivery: subjective health; their heart disease; impact of illness and its treatment In depth interview	In depth interview questions on lifestyle change since diagnosis	Five themes were derived from the field notes and in-depth interviews: • Expectations about heart disease – although aware of genetic risks and identified symptoms as being heart-related reported this was unexpected diagnosis. • Perceptions of well-being – judged well-being in terms of symptoms still experienced after surgery, some then disappointed by outcome. • Lifestyle changes since diagnosis – women aware of	Conduct of study Data partly collected by observations during clinical service delivery, may be more naturalistic findings. Analysis Quality check on data analysis using recommended strategies. Design Retrospective design implied All CABG/PTCA

		questions on: expectations and feelings about heart disease; perceptions of well-being; impact of illness and surgery on relationships and domestic and community roles		changes needed but found it difficult to make these - Impact on relationships and roles – reported both positive (appreciating support and activities they almost lost) and negative (poor health, withdrawal of others due to illness) impacts due to heart disease. - Feelings about heart disease – range of feelings reported from trying to move forward and think positively to fear and guilt.	Possible sources of bias or distortion Only looked at females so findings not generalisable.
Pullen, S.A., Povey, R.C., & Grogan, S.C. (2009) 8 women recruited during their in-patient cardiac rehabilitation in 2 Gloucestershire hospitals.	Cross-sectional Used IPA Aim: explore womens' beliefs about cardiac illness and rehabilitation, and how these relate	Interview schedule, 6 questions (with prompts), based on IPs: understanding of their heart condition (illness	Interview schedule, 6 questions (with prompts), on views about cardiac rehabilitation:	Planning to attend group: - Making sense and poor understanding – did not see why had developed heart condition, keen to make sense of their condition; - determination and needing social support – motivated to recover;	Conduct of study Clear questions based on IP dimensions & multiple questions on CR attendance and influences on this. Analysis Quality checks on data using recommended strategies.

5 were willing to attend cardiac rehabilitation, of which one had CABG after MI and one had PTCA. Other 3 willing to attend had all had MI, as had 3 who declined rehab. Age range 51 – 76 yrs (mean = 66)	to decision to attend cardiac rehabilitation or not	coherence); affect of heart condition in the past and future expectations (consequences); what they can do to manage their condition (coping, controllability); cause of their condition; how long it will last (timeline acute/chronic); what they can do to influence recovery	Initial views of CR; benefits; drawbacks; others opinion on them attending CR; what would encourage their attendance; what would restrict their attendance	• emotional reactions – expressed consequences in emotional way e.g uncertainty, low mood; • control – need for lifestyle control important; • positive value of cardiac rehabilitation – saw positively and felt could cope with any barriers Declined rehabilitation group: • Previous cardiac history and co-morbidity – dealt with previous cardiac problems so didn't need help again or saw co-morbid problem as greater than heart condition; • cause and control conflict – causal beliefs sometimes different to health professionals, did not see links between cause and need for lifestyle change; • independence – independent	Design Low proportion of CABG/PTCA patients (2/8) & both in cardiac rehab intention group Possible sources of bias or distortion Only females from white ethnic groups in study.

		(control/ curability)		attitude in 2 participants; • anxiety – anxiety resulting from cardiac condition led to self-restriction in some; • no need for CR – felt able to cope themselves or with family support	
Tolmie, E. P., Lindsay, G. M., & Belcher, P. R. (2006). 62 patients who had undergone CABG 7 yrs previously 52 males, 10 females 42-81 yrs (mean =64 yrs)	Cross-sectional but part of longitudinal study Aim: to look at the effects of CABG on health and well-being over time	Guideline questions about life before operation: patients' perceptions of their health and well-being, impact of cardiac problems on their lives, expectations of the outcome of the operation	Guideline questions about current health: patients' perceptions of current health and well-being and how related to their expectations, reflection of their thoughts on	Four main themes identified: recovery and rehabilitation, seven years on, maintaining a positive approach, and health behaviour change Recovery and rehabilitation: much variation in recovery experiences, with concern about pain and how would cope post discharge frequently mentioned. Others saw operation as minor interruption to daily life – particularly if had daily activities they needed to return to. Most saw cardiac rehabilitation as undemanding in terms of exercise but valued the camaraderie.	<u>Conduct of study</u> For qualitative work large number of participants <u>Analysis</u> Researchers continued collecting data until all new topics were exhausted. Rigorous checks were made to ensure that the themes identified were correctly identified. <u>Design</u> As well as illness perception area the findings also covered some aspects of coping.

		and its impact on their health and well-being after surgery Guideline questions about post-surgery: individual accounts about the recovery process, rehabilitation services, perceptions of need for and action in making lifestyle changes	CABG in terms of recovery process and overall effect on their life up to this time-point	7 years on: Some felt results of operation exceeded their expectations, and had a better and longer life; those who felt no benefit or decline in QoL had low level symptoms prior to surgery or symptoms not changed or worsened post-surgery. Majority would have operation again if could go back as it was a life saver. Many believed that emotionally they were less tolerant now than before surgery. Maintaining a positive approach: Participants saw their physical and psychological well-being as inter-dependent; aimed to avoid excessive exertion and high stress. Those whose life goals had been disrupted due to surgery or cardiac problems suffered lower self-esteem and poorer psychological well-being.	<u>Possible sources of bias or distortion</u> As data collected 7 years after surgery recall of events prior to and shortly after surgery may not have been accurate, and due to the restricted nature of the participants the results are not generalisable.

				Denial was a frequently used coping strategy for ignoring or re-attributing cardiac symptoms post-surgery. Health behaviour change: Few participants had stuck to all their recommended lifestyle changes and some also avoided medication. Justified due to contradictory advice and perception that advice frequently changing, others claimed adverse health habits too ingrained or only comfort.	

There were a total of 7 qualitative papers in the review which will be discussed in the order they appear in table 4.7. Darr et al. (2008) investigated differences between the causal illness beliefs held by South Asians and those of a European background living in the UK, and corresponding lifestyle changes in the 12 months after admission to hospital for cardiac problems. A range of key behaviours were examined - smoking, alcohol use, diet, exercise and stress. In order to assess these issues a structured set of questions were used in one-to-one interviews. The areas covered are shown in table 4.8.

Table 4.8 Summary of abridged version of topic guide for patients (adapted from Darr et al., 2008)

Topic Area	*Types of question*
Understanding of condition	Assessment of health and preventative behaviours before heart problems Co-morbid conditions and how severely they rate them compared with heart problems Causes of heart condition
Journey through the healthcare system	How realised had heart problem How explained to them and by whom Any changes to lifestyle recommended and by whom Invited to attend cardiac rehabilitation or not and their opinions of this
Efforts to regain good health / prevent further problems	What need to do to improve health What actually do and is this sufficient Barriers to preventative behaviours Assessment of family support
Impact of heart disease on lifestyle and relationships	How life has changed since developed heart problems What would help them cope better Any changes in relationships with family since diagnosis Any psychological impact Do they believe getting better and what would help this process Plans for future

While the study focused on causal beliefs, as can be seen from the above table there are also items which relate to other aspects of the CSM, such as consequences and emotional representations. However, these are not explored in the analysis of the study reported by the authors. The authors drew the questions used in the topic guide from the literature and then asked for feedback from a group of individuals who had experienced CHD, both South Asian and European. Participants were interviewed in their preferred language (for example, Urdu or Hindi), which will have helped ensure that all the participants fully understood what was being asked of them. The participants in the study were predominantly from a South Asian background (n=45), with a smaller European group for comparison (n=20). Full details are given in Table 4.9.

Table 4.9 Characteristics of the participants in the research by Darr et al. (2008, taken from Darr et al., page 93)

Religion / ethnicity	Males	Females	Mean age in years (range)
Pakistani – Muslim	10	10	59 (46-72)
Indian – Sikh	7	5	63 (48-79)
Indian – Hindu	9	4	63 (40-82)
European	10	10	66 (42-83)

Framework analysis, in which the data analysis is carried out using the question areas as pre-allocated themes, with responses from the interviews being allied to these areas, was used in this study. Good qualitative data analysis strategies were followed. The authors reported wide variations in the participants' experience of diagnosis with heart problems, with a similar range of explanations given by the health professionals the participants encountered. Overall, the participants seemed unsure about the causes of their heart problems, particularly in the case of the Pakistani-Muslim group, though the authors reported this group as being least likely to speak English so they may not have understood what they were told.

The most common cause put forward was family history. All the groups put forward this as an explanation for the development of their heart problems, but those who saw it as a more important cause were the European participants, with some of them having developed quite a fatalistic view, and used this to justify their lack of belief in the benefits of lifestyle change. Others who reported family history as a cause failed to link this to any lifestyle factors, but did sometimes change their behaviour. For example, one participant had a father who had died of heart disease, he had diabetes and was a smoker but could not understand what had caused his heart attack; but had tried to increase his exercise and reduce his smoking.

Older participants were particularly likely to believe in fate as a cause across all groups. South Asian participants often believed that God was responsible for their heart problems (it was his will), rather than being due to anything they had done. The most common cause suggested was stress. Frequently these stress problems were attributed to family related or life events. Those who had attended rehabilitation reported that they had attended sessions on coping and stress management, with many given audiotapes to take home, However, very few of these individuals reported actually using them at home. The participants overall had tried to reduce their stress levels but this was seen as difficult for many of them.

The roles of smoking, activity levels, and diet were considered as possible causes. The European group had a greater proportion of current and ex-smokers than the South Asian groups; and South Asian females were least likely to smoke. Looking at quitting smoking, the Pakistani-Muslim group had been most successful. Within the other groups many individuals had continued to smoke but at a reduced level, even though they knew that this was damaging their health. The European group were most resistant to healthcare messages on smoking reduction, with some not acknowledging links between smoking and cardiac problems. Across all groups those who had failed to quit justified their behaviour by using examples of individuals they knew with CHD who did not smoke, or stated smoking was a way of managing stress.

Lack of time, co-morbid medical problems and increasing age were given as reasons not to exercise, with many stating vigorous exercise inappropriate at their age and only doing general activities such as walking. However, even walking was not always a regular activity, with poor weather and physical symptoms being used as a reason for this. Across the groups many recognised that they were overweight and needed to diet. There were some gender and ethnic differences here, with South Asian men being more likely to see themselves as overweight and needing to diet while the converse was true for the European group, with women seeing their weight as more of a problem that needed attention. In all groups acknowledging weight problems did not necessarily mean they made the link between diet and CHD. South Asian participants were slightly more likely to make this link than Europeans, though the European participants were more willing to improve their diet by switching to low fat foods and reducing their intake of sweet foods. Overall, the participants demonstrated a lack of knowledge about how to reduce their weight.

Across all the behaviours discussed it was not clear if intentions to improve lifestyles had been implemented. Useful links were made, however, between the attributed causes and intentions to make changes or not. The authors concluded that demographic differences of age and gender were often more important than ethnic differences, indicating that there was not a need to view ethnic grouping as a differentiating factor when looking at causes and lifestyle change in CHD patients.

In terms of the overall quality of the paper, there are two major issues with this study. Firstly, the authors interviewed all individuals approximately a year post discharge from hospital. They justified this by saying it allowed individuals to have gone through the recovery and rehabilitation period which is useful, but by utilising a single data collection point the participants recall of what they experienced and what they were told by health professionals may be less accurate than if they had used more collection points to explore changes in beliefs and behaviour over time. Secondly, while they stated that around a third of their participants had undergone rehabilitation, they did not separate out these individuals in their analysis, so differences in the beliefs and behaviours of attenders and non-attenders could not be assessed. As rehabilitation programmes aim to help individuals identify risk factors and change behaviour this would seem to be a major omission. Also, as they looked only at causation in their analysis they did not fully assess the CSM.

The second study was a much smaller qualitative study with only 16 participants all recruited from cardiovascular wards and outpatient clinics in Taiwan (Lin et al., 2009). Half the participants had had an MI in the past; and the majority had undergone heart surgery or a related procedure: 10 PTCA alone, 1 CABG alone, 1 CABG and PTCA, and 1 catherisation. The participants were identified while hospitalised and interviewed while still in hospital or clinic. The study explored Taiwanese cardiac patients' experiences and beliefs about their heart disease, whether they had any misconceptions or maladaptive beliefs about their disease, and whether they practiced any maladaptive coping behaviour. The researchers used the CSM as a basis for their research, looking at the interaction of cognitive and emotional representations of cardiac disease and their impact on coping behaviours, which included diet and exercise behaviours. One-to-one semi-structured interview using a topic guide were carried out in the language of choice of the participant (either Mandarin or Taiwanese). The transcripts were then analysed using thematic content analysis and framework analysis. Details of data checking procedures were given in the paper.

The authors identified five main themes: symptom perception, causal attribution, control, protecting the heart, and feeling better. Participants reported a wide range of symptoms including classic MI and angina symptoms, such as chest pain and shortness of breath. However, many did not realise these were linked to their heart initially, attributing them to other causes such as indigestion or a previous back injury. The most common causes for heart disease put forward were stress, unhealthy lifestyles (diet/obesity, smoking and exercise), genetics and the aging process. Ageing was seen as a cause predominantly by older participants (>70 years). In this study few participants were unsure of the cause of their heart disease, unlike those in the Darr et al. study, and even the unsure individuals were able to say that factors such as those detailed above were general causes of heart disease.

All of the participants had realistic beliefs about the chronic nature of their illness, believing that while their condition could not be cured it could be managed by medication. Those who felt a lack of control over their heart disease also perceived it as more severe and reported greater anxiety and fear levels. This is in line with findings in various other conditions (Hagger & Orbell, 2003). The fourth theme looked at what the participants were doing to protect their heart. The authors discerned links between beliefs about cause and coping strategies used, with those who did not attribute their disease to their lifestyle being more likely to use avoidance related coping such as avoiding all physical exertion. Links were also found with such avoidant responses and perceptions of poor control and greater consequences in some female participants. Such maladaptive strategies (avoiding exercise or stressful situations) were common, with less than 50% of participants reporting exercising regularly or eating healthily. The final theme looked at feeling better and what they felt could help this. In accordance with the CSM, the participants seemed to assess their cognitive representations in terms of their outcome; and in particular their current symptoms. Those who reported more symptoms acknowledged they needed to change their behaviour, but believed that behaviour change was only essential until they felt better, rather than a prolonged lifestyle change. When assessing their emotional representations, individuals seemed focussed on avoiding stress and excitement.

A particular strength of this paper in comparison with other qualitative pieces of work is that it does link together information from the different parts of the CSM across participants. Therefore the authors were able to make links between different aspects of IPs (for example poor control and severe consequences seemed associated with anxiety), and, more importantly, between these perceptions and avoidant coping strategies. As such, it is a good evaluation of CSM in this patient population.

Although the authors found few differences in the beliefs of Taiwanese patients to those from other cultures there was one important confounding factor raised by the authors which concerned the reporting of emotional issues. In Taiwanese culture the expression of emotional reactions is seen as something to be avoided, and the participants in this study frequently declared they had no emotions about their cardiac illness. Therefore, emotional issues may well have been under-reported. The authors did agree that this needed further study, with the separating out of the cognitive and emotional aspects of individual’s responses being required.

The third qualitative study was very different to the other studies in that it was not based on the CSM. Ononeze et al.’s (2009) aim was to see if qualitative methods, and in particular Grounded Theory, could be used with cardiac patients in order to provide a theory of secondary disease prevention. This paper concentrated on the process of the research rather than outcomes. Twenty-six individuals with established coronary heart disease were selected from a range of GP practices across the west of Ireland to provide a range of urban, rural and city practices. After the first 22 participants it was felt that all new data from the interviews with the participants was exhausted, and the final 4 interviews confirmed this. The majority (n=15) had experienced an MI in the past, with 11 being formally diagnosed with angina. No specific details on any relevant cardiac procedures were given for the participants; however the quotes given indicated at least one of the participants had had a PTCA, and one a CABG.

In terms of the other constructs within the systematic review question, IPs and lifestyle change or attendance at rehabilitation, there is evidence that the authors identified issues around illness perception factors from both the IPQ-R (symptoms, controllability, and illness coherence) and lifestyle changes. There is a lack of detail in the paper about how the authors collected their data, and in particular the topic guide questions they used, in order to assess individuals experience of heart disease; but as this was not the primary aim of the study this is not unexpected. The authors used appropriate data analysis methods. Their initial research led to a model of living with heart disease which they called the “keeping it going” theory. This is illustrated in diagram 4.4 overleaf.

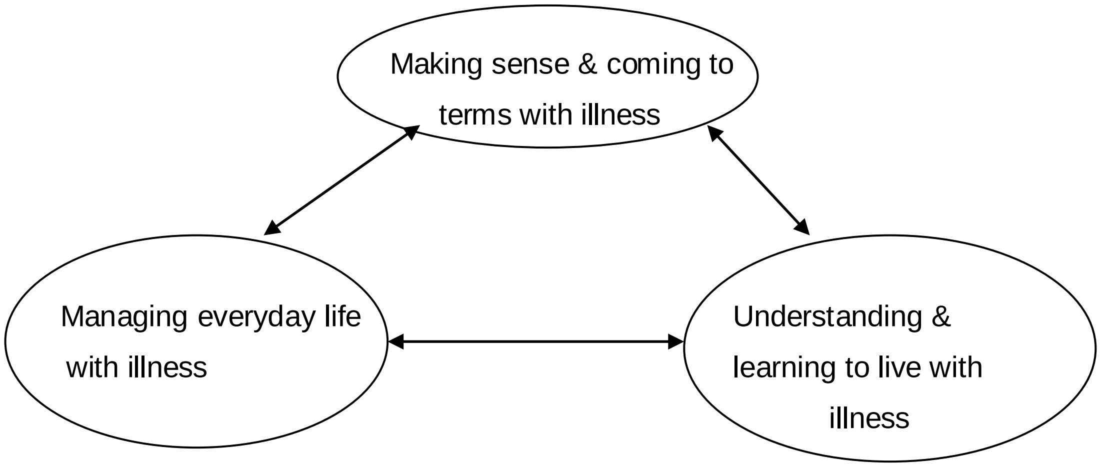

Fig 4.4 The Theory of Keeping it Going (taken from Ononeze et al., p.362)

The authors concluded that choosing secondary preventative behaviours was related to two interacting systems: personal experience and beliefs; and availability and type of service provision. The authors then put forward the idea that three factors “explain” secondary health behaviours in cardiac patients: knowledge beliefs and attitudes to heart disease (which include IPs); the impact of health and social interactions (such as communications with health professionals); and implications of cardiovascular health policy (such as availability of services).

The ability of the participants to carry on as normal increased over time, adding weight to the suggestions made in other research that IPs change over time, and also that the perceptions of those who have had long term problems that have led to surgery may be very different to those who have had an MI with no prior awareness of having heart problems to this. Participants predominantly reported positive experiences with few symptoms being reported. Therefore participants may not have had very well developed IPs at the time of interview; indicating a need for further research into those who are not having their heart problems managed well or who have had relevant treatment such as cardiac surgery more recently in order to fully assess the proposed model for a more general cardiac population.

Page et al. (2008) set out to explore patients’ attitudes after PCTA surgery, examining patient experience in order to ascertain satisfaction with the care and support received from the health professionals involved in treatment; and whether participants felt they had benefited from rehabilitation or education on lifestyle change. 11 participants were recruited the day after their PTCA, and interviewed 4-6 weeks after discharge. Therefore, there was not that much time for them to change their behaviour or attend rehabilitation; so the authors may actually have been assessing either pre-surgery behaviour or future intentions. All the interviews in this study took place in the individuals own homes, which may have led them to feeling more relaxed and open. No details were given of the topic guide used. The authors used a combination of Grounded Theory and Framework analysis to analyse the interviews and followed most qualitative analysis recommendations.

Five themes were identified. Firstly, misconceptions about the cause of their condition, with the majority of participants unsure of the cause of their cardiac problems. Secondly, participants did not find the PCTA experience stressful; indicating that those undergoing a PCTA may be very different to those experiencing an MI or CABG and hence emphasising the need to assess patient groups separately. The third theme was ”two procedures may double concerns”; referring to a sub-group of participants who had exploratory angiograms and their PTCA at different times rather than as one longer procedure and found this stressful due to the pain involved. The fourth theme was pain and anxiety as a result of manual digital pressure; some participants found the removal of the sheaths used to keep the access arteries open during the procedure stressful and painful. The final theme was the lack of post discharge advice and support. This was the most detailed theme. While the majority of the participants were happy with the procedure itself they were unclear about any short term physical restrictions they should adhere to after surgery or the lifestyle changes they needed to make in the longer term. Many were also not referred on to cardiac rehabilitation, but this is not standard for PCTA patients in Australia. Some also felt anxiety due to the lack of advice and support they received.

The next study described the experiences of 15 mid-life women with heart disease post-surgery (Plach & Stevens, 2001). The authors noted an over-representation of males in previous research, and that those studies that did include women tended to have older females than males so were not actually comparable groups. Middle aged women with heart disease were therefore felt to be an under-studied group.

The method of data collection also differed for the majority of the participants, with 13 women having conversations with the researchers during routine appointments rather than formal interviews. These were then added to observations the researchers made during these conversations to produce a set of field notes. The remaining 2 women, recruited later, underwent more traditional in-depth, one-to-one interviews shortly after surgery. For the majority of the women this meant that there were no set questions but the researchers discussed with them issues such as how they saw their health, their thoughts on their heart disease, their life since diagnosis, and the impact their cardiac disease and treatment had had on their lives.

The notes made from these conversations were then analysed using content analysis which produced 7 initial themes: expectations about heart disease; physical health; psychological health; perceptions of well-being; lifestyle changes; relationships; and social roles. The final 2 women who underwent interviews were recruited as a check on these themes, and to provide further elaborate detail on them. The analysis of the data collected appears to have been carried out in a professional manner. Their final analysis identified five separate themes, but within each of these they found contradictory findings both between and within individuals. These themes are given in table 4.10.

Table 4.10 Themes and examples from the Plach & Stevens study

Theme	**Examples**
Expectations about heart disease	Details about diagnosis & how interpreted symptoms Responses often contradictory e.g. knew family risk but would not happen to them
Perceptions of well-being	Health post-surgery judged by physical symptoms and impact on daily activities Most felt ambivalent – good & bad aspects reported
Lifestyle changes since diagnosis	Felt positive about making changes but difficult to put into practice Changes unavoidable
Impact on relationships & roles	Affected full range of social relationships, both positive e.g. family more supportive and negative e.g. worries about retaining independence
Feelings about heart disease	Both positive and negative emotions reported Some looked to future & tried to think positively, others feared the future or felt guilt or anger at developing heart disease

The nature of the field notes allowed for changes in perceptions and behaviour over time to be noted, but the authors do not seem to have fully taken this opportunity, reporting the findings in a more cross-sectional manner. The authors acknowledge that more longitudinal research is needed in this area to allow for changes in perceptions to be assessed. It also appears that all data collection took place relatively shortly after surgery so the surgical experience may have affected participants' perceptions. While the findings of Plach and Stevens are helpful, particularly in supporting the paradoxical nature of other studies discussed so far, they do not make links between perceptions and behaviours, and only uses a female population.

The penultimate qualitative study (Pullen, Povey & Grogan) examined women's decision to attend cardiac rehabilitation rather than lifestyle changes. The aim of the study was to describe how participants thought about their cardiac problems and cardiac rehabilitation and to examine how these thoughts related to their decision to attend cardiac rehabilitation or not, with particular emphasis on any barriers. The authors used two theoretical models to underpin their study, the CSM and the Theory of Planned Behaviour (TPB, Ajzen, 1991). The TPB states that an individual's intention to practice a behaviour can be predicted on the basis of their attitude towards this behaviour, their subjective norm, and their perceived behavioural control. Attitude is determined by the consequences the individual believes is linked to this behaviour (Maio & Haddock, 2010), more specifically by beliefs about how likely these consequences are and how valued they would be. The term subjective norm refers to the individual's beliefs about what valued others (e.g. peers, family members) would think about this behaviour. Perceived behavioural control refers to the individual's beliefs about how easy or difficult it would be to carry out this behaviour, which relates to their beliefs about the opportunities, barriers and resources they have to carry out this behaviour. The TPB then hypothesises that actual behaviour is predicted by this behavioural intention, although there is also hypothesised to be an additional direct path from perceived behavioural control to behaviour.

The women were all recruited after having an MI, CABG or PTCA, during the one-to-one in-hospital cardiac rehabilitation session given to all patients. Those who agreed to take part were then interviewed. At this point 5 women intended to attend rehabilitation and 3 declined (called accepting group and declining group). The authors do not seem to have checked whether these intentions resulted in actual attendance at rehabilitation however. Interview questions were derived from the two models underpinning the study. Twelve main questions were used; 6 assessed IPs and 6 attitudes towards rehabilitation and attendance intentions. The 6 questions relating to IPs were: what do you understand about your heart condition? (related to identity and illness coherence); how do you feel your heart condition has affected you / will affect you in the future?(consequences); are there any ways you think you can reduce these problems?(personal control, possibly treatment control); what do you think caused your heart condition?(causes); how long do you think your heart condition will last?(timeline – acute/chronic); and what could you do to influence your recovery or improve your heart condition?(personal control, possibly treatment control). The 6 cardiac rehabilitation questions related to their views on rehabilitation, the benefits and barriers they saw in taking part and the beliefs of others important to them about attending.

The findings were analysed using Interpretative Phenomenological Analysis (IPA). IPA is a recently developed qualitative research method that aims to understand the experience the participant has had from his or her own viewpoint. As such, it is common to have only a small number of participants who have undergone a common experience (in this case an MI, CABG or PTCA) in order to explore individual interpretations of this event (Smith & Osborn, 2003). The researcher does not aim to explain these beliefs but merely to describe them and to attempt to convey the participants' lived experiences. In common with other qualitative techniques, themes emerge from the data collected, rather than a pre-determined structure being imposed by the researcher, with superordinate (or overarching) themes encompassing a range of individual variation across participants being derived from an iterative analysis of the data. In the paper currently under consideration, IPA analysis led to the identification of 5 superordinate themes being identified for each of the groups. These can be seen in Table 4.11

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Table 4.11 Superordinate themes found by Pullen et al.

Accepting group		**Declining group**	
Theme	**Example**	**Theme**	**Example**
Making sense & poor understanding	Took time to process symptoms and take on board diagnosis – surprised by diagnosis	Previous cardiac history & co-morbidity	If had history of cardiac disease saw no need for rehab as knew it all already Co-morbid conditions more important than cardiac
Determination & needing social support	Determined to recover from illness but worried about available support	Independence	Independent attitude, saw rehab as asking for help didn't need
Emotional reactions	Consequences expressed in relation to psychological state and activity levels Some reported negative feelings e.g. anxiety, anger, frustration	Anxiety	Anxiety relating to cardiac event
Control	Control levels variable but saw having some control over condition as important	Cause & control conflict	Participant & doctor cause beliefs contradicted in some Some evidence of dismissing doctor advice Contrast between reported causes & behaviour change intended
Positive value of cardiac rehabilitation	Viewed as important to recovery & felt anticipated barriers could be overcome	No need for cardiac rehabilitation	Poor understanding of benefits of rehab Perceived barriers a important & insurmountable Family support more important than rehab

The participants in both groups had poor understanding of their cardiac condition; however, the accepting group were aware of this lack of understanding while the declining group were not. In line with previous quantitative studies (e.g. Petrie et al., 1996; Cooper et al., 1999) the accepting group perceived more control over their condition and discussed the role of lifestyle factors to a greater extent, but attitudes towards the value of rehabilitation were the most important determinants of the decision to attend or not. A wider range of emotional responses to the cardiac event were described in the accepting group. The authors felt that future research should look at individual diagnosis groups both together and separately (e.g. CABG versus MI) to see if there were any differences between these groups.

Overall, the quality of this study appears to be good; IPA methods were followed well, and the study provided a useful exploration of decision-making related to rehabilitation attendance. In addition, the division of questions to cover both illness perception and views on rehabilitation was useful. The split into attenders and decliners was interesting, but there were few similarities between the groups for some of the themes identified. The women only indicated intention to attend rather than actual attendance.

The final qualitative study (Tolmie et al., 2006) has already been discussed as part of the previous systematic review (see section 5.1) so will only be discussed briefly here with those aspects relevant to the systematic review question currently being focussed on This was a retrospective study with interviews being carried out with 62 people 7 years after their CABG surgery. Among other things, participants were asked about their pre surgery health and wellbeing, and expectations of surgery; post surgery view of rehabilitation and beliefs about the need for life style change; and at the 7 year post surgery time point, were asked to reflect on the process of recovery and the degree to which their expectations had been met. Clearly, participants were being asked to recall what they believed and how they felt many years ago.

Four main themes and 11 sub-themes were identified after thematic analysis was carried out. See table 5.3 for full details of these. With respect to IPs, participants with few symptoms prior to surgery saw the operation as having little effect compared to those who had more pre-surgery symptoms. Some participants reported psychological problems post-surgery that remained long after surgery, and others reporting a switch in their nature from positive to negative or vice versa. There was some discussion of the strategies which participants had learned to use to control their physical symptoms such as avoiding physical exertion or stressful situations.

Of particular relevance to this review were 2 subthemes – attending class (rehabilitation) and lifestyle change. Overall the rehabilitation programme appears to have been well attended with the few who did drop out doing so due to physical limitations or pain. The majority of participants found the programme physically undemanding, with the social support aspects of the programme being appreciated most. The majority of participants had not changed their behaviour long-term, with some individuals only maintaining change in the short-term or for only some of the behaviours required. Others had not attempted to make changes as they saw no need to change or felt the changes required were too great.

Overall, the Tolmie et al. study benefited from its longitudinal exploration of participants perceptions from pre-surgery to 7 years post-surgery and the fact that all participants had undergone PTCA. However, there was little evidence of the pre-surgery perceptions in the findings detailed, and it was not possible to link the IPs to the lifestyle change outcomes in order to assess the study’s ability to address the systematic review question posed. A summary of the qualitative findings will now be given in table 4.12 overleaf.

Table 4.12 Summary of the qualitative findings

Study	**Illness perception dimension(s) assessed**	**Behaviour(s) investigated**	**Links between illness perceptions and behaviour made**
Darr et al., (2008)	Cause	Lifestyle change stress, smoking, physical activity, diet	Some evidence of behaviour prior to cardiac issues influencing causation beliefs (e.g. smoking) but did not necessarily lead to lifestyle change
Lin et al., (2009)	Identity; Cause; Treatment control; Timeline – acute/chronic	Lifestyle change	Common beliefs - cause due to lifestyle and lack of physical activity, sense of poor control and severe consequences; If not experiencing symptoms saw no need to change behaviour or adhere to medication
Ononeze et al., (2009)	Symptoms; Illness coherence; Controllability; Emotional representations	General secondary preventative behaviours	Stated IPs influenced secondary behaviours but no specific evidence provided
Page et al., (2008)	Cause	Attendance at rehab aim but not detailed in findings; lifestyle change	No links made between IPs and behaviours
Plach & Stevens (2001)	Consequences Identity	Lifestyle change	No links made between IPs and behaviours
Pullen et al., (2009)	Identity; Illness coherence; Consequences; Controllability; Timeline – acute/chronic; Cause	Attendance at cardiac rehabilitation	Declining rehab group – mismatch between perceived cause and behaviour change e.g. dieted even when not told or thought obesity a cause but dismissed their smoking as cause
Tolmie et al., (2006)	Identity Control Emotional representations	Attendance at cardiac rehabilitation; lifestyle change	No links made between IPs and behaviours

In assessing the overall ability of the 12 papers discussed in this review to address the systematic review question, “do IPs predict attendance at cardiac rehabilitation and lifestyle change after cardiac surgery”, there seems to be one fairly common finding, this is that participants are often uncertain about the cause of their cardiac problems. Other than that many of the findings seem very variable. This is partially due to the different methods used and the different dimensions of IPs assessed. In addition, there were variations in when the data was collected in relation to when heart surgery was performed and even the proportion of heart surgery patients in the different participant groups. Therefore, to clarify the role of IPs on predicting lifestyle change or attendance at cardiac rehabilitation after cardiac surgery there are a number of issues that need to be considered. Firstly, it is important to look solely at recent heart surgery patients as others, such as those who have experienced a recent MI or have had surgery a considerable time previously, may have very different IPs. Secondly, it seems clear that IPs and behaviour change over time. Therefore, there is a need to assess these over a long time span to assess the changing role of IPs. It would be particularly helpful to assess IPs prior to heart surgery to see if earlier perceptions have a predictive value that could be useful in terms of identifying areas for possible interventions to reduce any physical or psychological issues after surgery. The findings from these targeted literature reviews and the previous literature review chapters will now be used to inform the choice of research questions in the next chapter.

Chapter Five: The research questions

The primary purpose of this research is to explore the factors associated with changes in patients' quality of life (QoL) after cardiac surgery and attending cardiac rehabilitation. Using the framework of Leventhal's CSM, the research will examine whether illness perceptions (IPs) prior to surgery and at further time points in the patient's recovery process (post-surgery, post rehabilitation and one year post surgery) and coping strategies are associated with changes in quality of life following cardiac surgery and rehabilitation. Of particular interest are the influences that pre-surgery IPs and coping strategies have on post-surgery QoL.

To date, these issues have primarily been studied in post-heart attack patients, rather than in those who have undergone elective cardiac surgery. While some studies have included both heart surgery and MI patients (e.g. Cooper et al., 1999), they are usually treated as a homogenous group. Past research has primarily collected data at two main points. The first is in the immediate aftermath of heart surgery or an MI. This is a particularly traumatic time; hence IPs at this time may be temporarily altered in a similar way for both sets of patients. The second data collection point has often been a considerable time after surgery or an MI, at which point patients perceptions of their problems and their behavioural responses may have settled down into a pattern which is more difficult to change. There would seem to be a need to explore the IPs of heart surgery patients at a number of different time points in order to fully assess the changing role IPs may play.

This is also supported by the contrasting findings found in the research so far as to which particular IPs predict lifestyle change which may also be explained by the different timing points of data collection. For example, an MI patient may be very motivated to change their behaviour to avoid a subsequent MI in the aftermath of their MI, while a heart surgery patient also assessed shortly after hospital discharge may see no need to change his or her behaviour due to the perception that the surgery has "fixed" their heart disease so they see no need to practice preventative behaviours such as exercise or adhering to a healthy diet. In a number of cases an MI patient may not have seen any sign of cardiac problems within themselves until their MI, while those individuals undergoing cardiac surgery are predominantly going to be those with an established diagnosis of cardiac problems which they will have developed IPs around. This further supports the need to look at cardiac surgery patients as a separate group. It may also be necessary to examine differences between PTCA and CABG patients as the nature of the two procedures means that

PTCA patients may believe that, as their treatment is less invasive, it indicates that their cardiac problems are less severe. The differing recovery times from the two procedures may also affect illness perceptions, QoL, and behavioural change intentions in the immediate aftermath of surgery.

This present research will therefore examine IPs, QoL and lifestyle change at a number of time points for both CABG and PTCA patients. These patients differ from those in much of the previous research in that, while they may have had a prior MI in some cases, at the time of recruitment they are awaiting elective planned cardiac surgery as a result of established CHD. The time points that will be used are pre-surgery (to allow for accurate measurement of established perceptions and QoL), the immediate post-surgery point, post- cardiac rehabilitation, and one-year post surgery. These latter time points allow for the effects of treatment on IPs and QoL to be assessed, as well as looking at changes over time. We predict that illness perceptions will change over time, and that the relationship between QoL and lifestyle change factors (including attendance at cardiac rehabilitation) and IPs, will also change over time.

As stated earlier, research into IPs in cardiac patients has concentrated on factors related to lifestyle change and cardiac rehabilitation, driven by the need to promote secondary preventative behaviour in those with CHD. There is a much smaller set of research that has looked at the role of illness perceptions on QoL. This is in contrast with the main purpose of cardiac surgery procedures such as CABG or PTCA, which is to increase life expectancy and improve quality of life.

In addition, many of the studies detailed in the previous two chapters have focused on how cognitive representations of cardiac problems relate to various behavioural outcomes, with the greatest emphasis being on causal attributions. There is therefore a need to look further at how emotional representations drive different coping strategies, which may result in different levels of psychological well being in this patient group. The psychological wellbeing and quality of life of post-cardiac surgery patients is important in its own right, but may also impact on behaviour change – for example, depression has been found to affect attendance at cardiac rehabilitation (Stafford et al., 2009). As reviewed earlier, it is known that those with chronic illness, such as cardiac problems, use particular coping strategies (Endler, Kocovski & Macrodimitris, 2001) which impact on patients' psychological health. For example, repressive coping strategies have been linked to the development of post-traumatic stress disorder in cardiac patients (Ginzburg, Solomon & Bleich, 2002).

The CSM suggests that emotional representations and cognitive representations of illness interact with each other. Emotion regulation strategies, driven by emotional representations of illness might therefore be related to cognitive representations; which is a mechanism by which cognitive representations may impact on patients' QoL. As such there is a need to more fully assess Leventhal's CSM by assessing cognitive and emotional representations as well as measuring coping strategies at all four time points.

The above research issues will be addressed using a longitudinal study of patients who are to undergo elective cardiac surgery, with data collection at the 4 time points mentioned earlier. In detail these are: 6-8 weeks pre-surgery, 2 weeks post-discharge, 14 weeks post-discharge (when they should have completed rehabilitation), and 1 year post-discharge. Data on the participants' IPs, coping strategies selected and QoL will be collected at all time points, with data on cardiac rehabilitation attendance and lifestyle behaviours being collected post-surgery.

5.1 Specific predictions

In line with previous research into the role of IPs on cardiac patients (Aalto et al., 2006; Stafford et al., 2009; Alsen et al., 2010) it is expected that those with poorer personal control beliefs, more severe beliefs of the consequences of their cardiac problems, less understanding of their condition, and more negative emotional representations will have poorer quality of life.

Secondly, it is expected that there will be associations between the less adaptive coping strategies (emotional preoccupation and distraction) and poorer quality of life, while those with better quality of life will endorse instrumental coping strategies.

Thirdly, it is expected that those attending cardiac rehabilitation will have demonstrated greater beliefs in personal and treatment control, experienced more severe consequences due to their cardiac problems, and be more likely to attribute their cardiac problems to lifestyle choices than those who do not attend, in line with previous research (e.g. Cooper et al., 1999; Yohannes et al., 2007).

Finally, it is expected that those making a positive lifestyle change will display a greater belief in treatment control, see their cardiac condition as having more serious consequences and believe that their own lifestyle is a cause of their condition, together with reporting more positive emotional representations.

Chapter 6. Participants and outline of procedures

This chapter will detail how participants were selected and the procedures that were undertaken on their recruitment and progression through the study. How ethical considerations and confidentiality were addressed will also be covered within this initial methods chapter. It will also introduce the measures and data that were used throughout the study; this information will be expanded on in the other chapters within the methods section of this thesis. How the data was collected during this study will also be covered; in particular, the issue of how the collection methods may have introduced any potential biases and how these were addressed will be examined.

6.1 Participants

Participants were targeted from two geographical areas: North Wales and Chester and surrounding areas. They were identified from those patients undergoing cardiac procedures at The Cardiothoracic Centre (CTC) in Liverpool by means of the name of the cardiology consultant who referred them for their surgery. This meant that all the patients being referred from the two targeted hospitals (Countess of Chester and Wrexham Maelor) were invited to participate, together with some private patients who were also under the care of the consultants who had agreed to the study. Full details of the ethical procedures followed will now be given.

6.1.1 Ethical procedures

Due to the highly confidential nature of this research strict procedures were implemented and followed to avoid any participants being identifiable. All patients were given a study participant number on their agreement to take part in the study. This was also written on their consent form which was then stored in a locked filing cabinet in the researchers office, together with their address details so they could be sent questionnaires at the study assessment points. Any communication between the researcher and the member of staff at The Cardiothoracic Centre who worked on the project – for example, to notify the researcher when patients were admitted to hospital and when discharged, used only the patients initials (except when there was more than one person with the same initials where the first part of their postcode was also quoted). When electronic files were transferred between the researcher and the hospitals they were password protected with the password being verbally given. For those patients taking part in the interview component of the research the data disks they were recorded on were only identified by the participant number and assessment stage. Due to these restrictions the medical data from the research was only known by the researcher and the member of staff from The Cardiothoracic Centre, and all other data by the researcher alone.

Ethical approval was formally sought and granted from a range of organisations. Initially ethical permission was sought and granted from the NHS Local Research Ethics Committee (LREC) appropriate for the Countess of Chester (South Cheshire Local NHS Committee C297/03). This was followed by submission to the Cardiothoracic Centre, where the project was approved firstly by the patient led ethical committee then the formal scientific committee (Service Users Research Awareness Group and Academic Committee, The Cardiothoracic Centre Liverpool NHS Trust). Once the NHS ethical committees had signed off on the project it was then sent to the University of Manchester's Ethical Committee for approval (03113). When the study was expanded to encompass Wrexham Maelor Hospital the original NHS LREC re-examined the proposal in order to transfer the ethical permission to a multiple rather than single site study. Copies of all ethical and related permissions can be found in appendix A. The formal inclusion and exclusion criteria are detailed in the next section.

6.1.2 Inclusion and exclusion criteria

Both male and female patients were recruited over a two-year period as permitted by the ethical approval granted. All prospective participants had to be over the age of eighteen at the time of invitation to the study, in order to give consent, and there was no upper age limit. However, due to the nature of the illnesses leading to CABG they were predominantly an elderly group. All targeted patients were due to undergo the relevant surgical procedure (CABG or PTCA) within the next six months.

Patients were excluded if they were unable to give informed consent. Those who might have had problems filling in the questionnaires were aided to complete the questionnaires if they wished to participate. Patients who had life threatening co-morbid illnesses were excluded due to the impact the other illness might have had on their quality of life scores. However, those with co-morbidity associated with heart disease (e.g. diabetes) were recruited to the study. More specific details on the recruitment procedures will now be given.

6.1.3 Recruitment procedures

Patients referred for a CABG procedure from the Countess of Chester hospital were recruited over a two-year period from September 2003-September 2005, and those referred for a PTCA procedure were recruited from September 2004-September

2005. In addition, patients referred for a CABG from Wrexham Maelor hospital were recruited from September 2004-September 2005 (PTCA patients from this hospital were so few in number that they were not targeted). In total 243 individuals were asked to participate in the study, of whom 113 (46.5%) initially consented.

As a requirement of the ethical approval for the study from CTC the informed consent was obtained by a member of their audit department staff. Initially, once the prospective participants had been identified from the database at CTC, an invitation letter, together with an information pack and informed consent form with reply paid envelope, were sent to their home address (see appendices B and C). Contact details for the researcher were also included in both the invitation letter and information packs, with the prospective participants being encouraged to contact her if they had any queries about the study.

6.2 Procedures

The study used a naturalistic, longitudinal cohort design. Once the signed consent forms were received by the relevant member of staff at CTC these were then forwarded to the researcher, who then sent out the first set of questionnaires. If the date the patient was scheduled to be admitted for their surgery was less than a week away this initial questionnaire was sent out directly by the CTC staff member. This was the first of the four assessment points of the study; these are illustrated in the diagram overleaf.

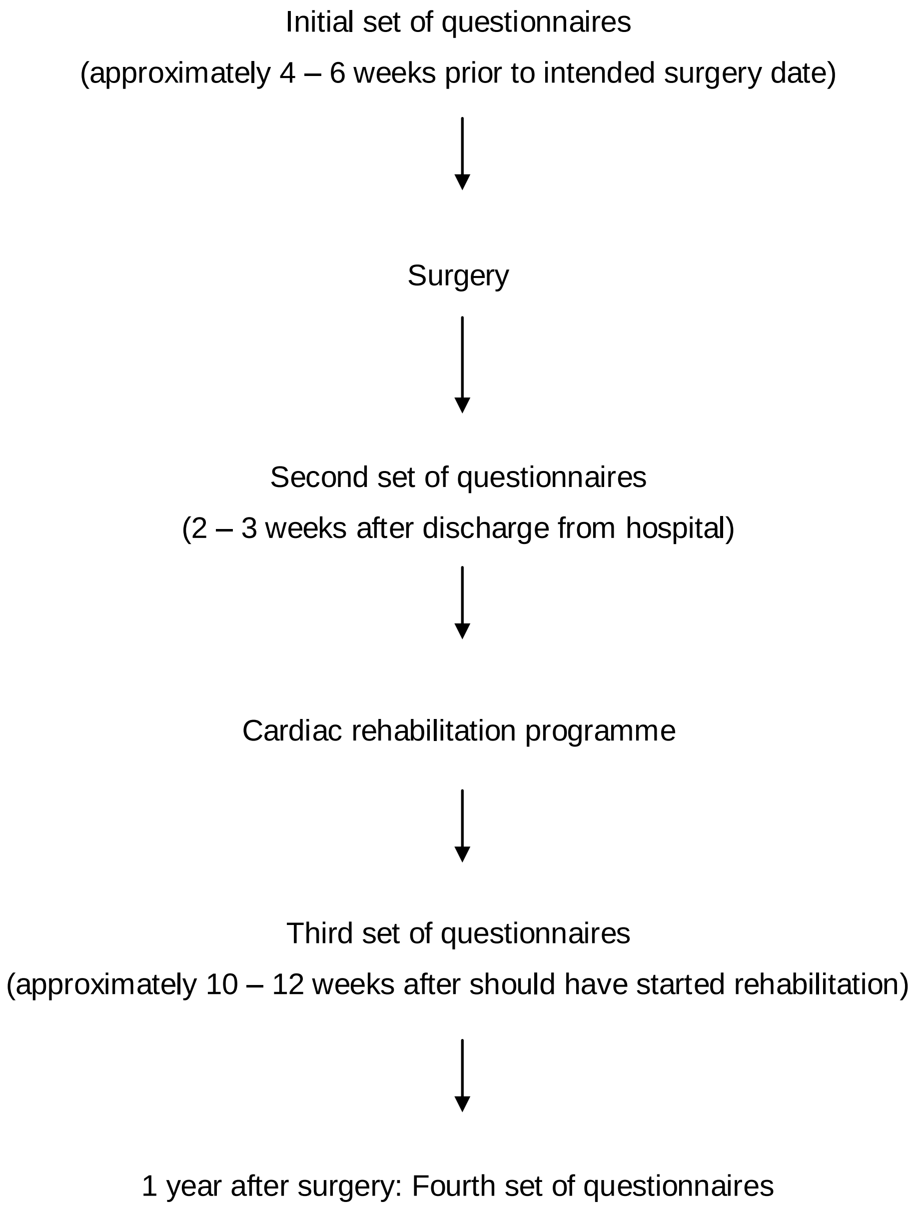

Figure 6.1 An illustration of the data collection points

The surgery referred to in the above diagram refers to either CABG or PTCA. For the CABG procedure patients are generally admitted to the hospital the day before the operation or, less frequently, on the day of the surgery itself and would ideally leave hospital 4 to 5 days later, though this is dependent on their individual recovery from the procedure. The PTCA procedure does not involve such major surgery, the patient is only sedated using local anaesthetic and their chest is not opened. Therefore, the in-patient stay for this procedure is shorter for this procedure, with patients being discharged either late on the day of the procedure or the following day unless there were complications. Further information on both these procedures can be found in chapter two.

6.3 The questionnaire measures

The study involved the use of four self-administered questionnaires that were given to all the participants at the four assessment points. These questionnaires were the EQ-5D Health Questionnaire (this was not analysed for this research but was included on the direction of the CTC), the MacNew Heart Disease Health-Related Quality of Life Questionnaire, the Revised Illness Perception Questionnaire (IPQ-R) and the Coping with Health Problems and Injuries Scale (CHIP) questionnaire. Full background information to the constructs being measured has been detailed in the preceding chapters (2 to 4), and reliability and validity information for each of these measures as applied to this sample will be provided in the results chapters. A set of demographic questions were also attached, asking questions such as age, gender, social and work status, diet (assessment points 2 to 4 only), and illness history. The type and number of measures that could be used was constrained by the permissions granted by the relevant hospitals and ethical committees. Copies of the questionnaire packs can be seen in appendices D and E.

6.3.1 The MacNew questionnaire

The MacNew is a heart disease specific measure of quality of life. It is a modification of the Quality of Life after Myocardial Infarction (QLMI) measure, which is a valid and reliable measure designed to be administered by an interviewer (Hillers et al, 1994). The MacNew adaptation has been designed to be self-administered and to be applicable to a wider range of cardiac patients (i.e. patients with myocardial infarction, angina pectoris, and heart failure). It has 28 questions, with the first 27 items combine to form scores for the three quality of life domains – emotional, physical and social. All these ask the respondent how they have felt in the last two weeks. Some of the questions relate to only one domain, some two, and one item all three domains. The emotional and physical domains are an average of 14 responses, and the social domain an average of 13 responses. The final question is not time related, unlike the other questions. It asks if the patients would undergo the same treatment again. This measure enables an examination of how the respondents' cardiac problems have affected their quality of life and allow comparison with other cardiac groups. The MacNew has been found to be the most appropriate disease-specific measure to use with patients with ischaemic heart disease after a review of the psychometric evidence for nine such instruments (Dempster & Donnelly, 2000). However, there has been some discussion around the allocation of items to the three factors (Dempster, Donnelly, & O'Loughlin, 2004). The latter authors suggested instead a 5 factor structure (emotion, restrictions, physical symptoms, perceptions of others, and social functioning). Other studies across the world, though, have supported the original 3 factor structure (Asadi-Lari, Javadi, Melville, Oldridge, & Gray, 2003; Hofer, Benzer, SchuBler, von Steinbuchel, & Oldridge, 2003; Hofer et al., 2004; Oldridge et al., 1998), and also supported the reliability of the measure with internal consistency for the 3 factors ranging from 0.93 to 0.95 in the English version, intraclass correlations of 0.73 to 0.95 and test-retest correlations of 0.61 to 0.87 (Hofer et al., 2004).

6.3.2 The IPQ-R questionnaire

The IPQ-R (Moss-Morris, Weinman, Petrie, Horne, Cameron & Buick, 2002) is designed to measure an individual’s illness perceptions (IPs). Research using a variety of different assessment techniques suggests patients ideas about an illness can be described around five coherent themes or components. These components together make up the patient's perception of their illness and provide a framework for patients to make sense of their symptoms, assess health risk, and direct action and coping. The major components of cognitive representations of illness identified from research (identity, timeline, controllability, consequences and cause) were discussed in Chapter 3, section 3.2.2. The IPQ-R is intended to provide a quantifiable measure of the cognitive components detailed above; it splits controllability into control by the patient and treatment-related control, provides two measures of time-line. These are a measure of whether the illness is seen as acute or chronic and a measure of stability versus fluctuation. An additional scale measures the extent to which the illness is understood – termed illness coherence.

As detailed in chapter 3 there is also an emotional representations subscale in the IPQ-R. The addition of this subscale allows for the examination of how these emotional representations affect coping responses and, hence, outcomes (Moss-Morris et al., 2002). The emotional representations subscale was designed to cover six attributional responses that had been linked to both changes in illness perception and treatment decisions (Cameron et al., 1993; Cameron & Leventhal, 2003).

Identity is measured by a count of the symptoms which the patient experiences as part of the designated illness or condition. The timeline, consequences, coherence, cure/control cognitive components, illness coherence and emotional representations are assessed using 38 statements about illness and asking the patient to say whether they agree with them or not using a 5-point likert scale.

The causes component is assessed by the use of 18 statements relating to possible causes, again using a 5-point likert scale and asking the patient to report their level of agreement with each statement. For the present research the cause data collected at baseline was factor analysed using principal component analysis to derive relevant subscales in line with the procedure recommended by Moss-Morris et al (2002). This led to the derivation of 3 sub-scales (psychological attributions, external factors, behavioural risk factors), with two cause questions being treated as individual predictors (poor medical care, heredity). More detail on this analysis can be found in chapter 8.

Test-retest analysis showed that the IPQ-R produced good correlations over both a three-week (in-patient renal dialysis group, n=28) and six-month period (rheumatoid arthritis group, n=75; Moss-Morris et al., 2002). Discriminant validity was assessed by comparing all subscales of the IPQ-R with the PANAS, using Pearson’s correlational analysis. The correlations found were generally small to moderate. Known group validity was assessed by comparing the two pain groups (acute and chronic). The two groups were significantly different on all subscales, supporting the known group validity of the revised questionnaire. Predictive validity was assessed using the multiple sclerosis patients. The cognitive representations subscales of the IPQ-R were used to predict physical and mental fatigue and sickness-related dysfunction, as measured by the Fatigue Severity Scale and the Sickness Impact Profile. Regression analysis demonstrated that all the subscales except the emotional representation subscale were significant predictors of emotional distress caused by their condition, and that these illness representations accounted for 36% of the variance in emotional representations for this group.

6.3.3 The CHIP questionnaire

The Coping with Health Problems and Injuries Scale (CHIP**,** Endler, Parker & Summerfeldt, 1998) questionnaire is designed to measure how the patients cope with their illness. It is a 32-item measure, giving a range of coping statements and asking the respondent to report how often they use each method on a 5-point likert scale. The statements combine to form measures of four different ways of coping: distraction, palliative (self-help responses aimed at alleviating the unpleasantness of the current situation), instrumental (problem-focused coping), and emotional preoccupation (fixation with the emotional consequences of the health problem). This allows an individual’s method of coping with illness to be assessed. The original paper reported reliabilities for the 4 subscales of 0.81 to 0.84 for men, and 0.78 to 0.82 for women. While later researchers have not found as large reliabilities across the subscales, Hadjistavropoulos, Asmundson & Norton (1999) reported 0.63 for distraction, 0.66 palliative, 0.77 instrumental and 0.84 emotional preoccupation), they have found it a suitable measure for assessing coping in those with chronic conditions with good construct validity. In addition, the CHIP has previously been used in patients undergoing cardiac rehabilitation in order to predict QoL (Corace & Endler, 2003).

6.3.4 Demographic and medical questionnaire questions

A range of demographic and medical information was also collected via the questionnaires. At the first data collection point (pre-surgery) patients were asked their gender, age, educational level, current social and occupational status, their smoking status, and about their cardiac history and any other serious medical conditions in themselves or their family. At the later time points questions about their educational, social and smoking status were repeated to detect any changes and they were asked to assess their current cardiac health. They were also asked a series of questions about their diet and alcohol intake in order to ascertain any changes to these after undergoing cardiac rehabilitation. More detail on these are given in chapter 12. Later in the research process, due to the variability in the quality of the cardiac rehabilitation records, a one-page questionnaire was sent out to all patients who had taken part in the study asking them questions about their attendance at cardiac rehabilitation (number of sessions attended, educational talks attended, whether they had continued with scheduled exercise beyond the 10 to 12 week initial programme) and their satisfaction with the rehabilitation programme. A copy of this measure can be found in appendix F. Only the data on the number of sessions attended was used for this thesis.

6.4 Medical data

This was obtained both from the referring hospital and the Cardiothoracic Centre who co-ordinate the actual surgery. The bulk of this information came from the records held by The Cardiothoracic Centre, and contained information on patients' medical status before surgery, as well as details of the surgery itself. Apart from information on how long patients were on the waiting list prior to their surgery and their length of stay in hospital all of this information was gathered after all patients had undergone their procedures. The variables collected are detailed in table 6.1.

Table 6.1 Medical data obtained from The Cardiothoracic Centre

Angina / cardiac status before surgery
Duration of cardiac problems
Time on waiting list prior to surgery
Diabetic history
Cholesterol level prior to surgery
Any family history of cardiac problems
Any previous cardiac surgery
Surgery intended
Actual surgery carried out
Any surgical complications
Time spent in hospital
Discharge destination

The records from patients' local hospital were also accessed in order to ascertain their attendance at cardiac rehabilitation, and again these notes were accessed once all patients had reached at least stage three of the study. In Chester this information was held in the patient's central notes and accessed via the Audit Office or directly from the central computerised records; while in Wrexham this information was held by the Rehabilitation team itself.

Table 6.2 Rehabilitation data obtained from local hospital notes

Whether invited to attend rehabilitation
Whether attended initial assessment session
Number of sessions attended
Educational sessions attended
Any reasons given for non-attendance
Whether invited to further exercise programmes (stage 4) co-ordinated by Cardiac Rehabilitation teams after completed basic programme
Whether indicated likely to attend stage 4 and any reasons given if declined

6.5 Addressing potential biases introduced by the data collection procedures

There are a number of possible points where bias could be introduced to the study. Initially, due to the self-selection nature of participant recruitment the actual participant group may not be representative of those patients undergoing such surgical procedures. Some comparisons can be made to examine whether the respondent and non-responder groups are similar on some demographic measures, this is detailed in chapter 8.

There are other possible biases related to the methods of data collection. The first of these is the use of questionnaires. Due to their design they will only uncover limited information, as self-report measures they are also open to the known issues with using such measures, and the patients may also have had difficulty understanding some of the questions posed by them. However, as the measures being used are established measures in the main, which should reduce these problems somewhat. The second area of possible bias relates to the medical data; in particular, the quality and accuracy of the information available. Such concerns are common to all such real world research in the health field. These issues, and any possible implications on the research findings, will be explored further in the discussion chapter.

Chapter 7: Introduction to the results section

7.1 Introduction

The results are organised into four separate chapters. The initial chapter looks briefly at the sample of participants, giving basic demographic details on the actual participants and comparing them with those participants who declined to take part in the research. This analysis is fairly limited however, as the hospital concerned was not willing to disclose a great deal of information about non-recruited patients for ethical reasons. Also within this first chapter (chapter 8), the available and missing data is detailed, details on the derivation of the cause subscales is given, and, finally, the different surgical procedure groups (CABG and PTCA) are compared to explore any possible differences between these two groups.

Chapter 9 used repeated measures General Linear Model analysis to look at changes in IPs, use of coping strategies and QoL over the four time points where data was collected while controlling for severity of cardiac problem pre-surgery. Chapters 10 and 11 used univariate correlations to uncover patterns in the data, and multiple regressions to determine which variables were predictive of the outcome in question. Chapter 10 examines whether pre-surgery perceptions and coping strategies can predict QoL in the longer term. Leading on from this, chapter 11 explores whether there are any cross-sectional associations between the measures of IPs and coping pre-surgery and quality of life at each of the later time points.

Previous research has looked at the effect of individual’s IPs on attendance at, and outcome after cardiac rehabilitation. Chapter 12 examines the role in predicting attendance of both coping strategies as well as IPs both prior to surgery and prior to cardiac rehabilitation. This chapter also examines the possible influence of IPs and coping strategies on lifestyle changes. In particular, the area of dietary changes is explored in depth to examine whether diet changed over time and, if so, whether pre-surgery and pre-cardiac rehabilitation illness perception and coping strategies were associated with dietary changes.

Chapter 8: The sample.

8.1 Introduction

During the course of this research a total of 262 participants were approached to take part in the study using the inclusion criteria detailed in chapter 7. Of these 113 agreed to take part in the research. Initially, differences between those who agreed to take part and those who declined will be detailed.

8.2 Differences between those who agreed to take part in the research and those who declined

Due to ethical restrictions imposed by the Cardiothoracic Centre very little data was available on the decliners. The data available was merely referring hospital, gender and type of surgery. Differences between the two groups for these two variables were calculated using chi-square analysis. The frequency tables for these analyses are given below in tables 8.1, 8.2 and 8.3.

Table 8.1 Frequency distributions for referring hospitals (% within referring hospital)

	Countess of Chester	Wrexham Maelor
Agreed to participate	98 (44.7%)	15 (34.9%)
Declined participation	121 (55.3%)	28 (65.1%)

As can be seen from the above table the participation was slightly higher in patients referred from the Chester hospital. However, chi-square analysis found this difference not to be significant (λ^2=1.426, p=0.24). Differences in gender between those who participated and those who declined are shown in Table 8.2.

Table 8.2 Frequency distributions for gender (% within gender)

	Male	Female
Agreed to participate	93 (46.3%)	20 (32.8%)
Declined participation	108 (53.7%)	41 (67.2%)

More males were referred for cardiac surgery and males were also more likely to agree to participate than the females (46.3% versus 32.8%). However, chi-square analysis showed this difference not to be significant (λ^2=3.468, p=0.08). Finally, differences in participation rate for the two surgery types are shown in Table 8.3

Table 8.3 Frequency distributions for surgery type (% within surgery type)

	CABG	PTCA
Agreed to participate	88 (48.9%)	25 (30.5%)
Declined participation	92 (51.1%)	57 (69.5%)

As seen in table 8.3, a greater proportion of PTCA patients declined to participate in the study than CBAG patients. Chi-square analysis confirmed that this difference was significant ($\lambda^2=7.777$, $p<0.01$). There are a number of possible explanations for this finding. Firstly, due to the less intrusive nature of this procedure the patients may not have seen the importance of the research (some may not even have considered themselves to actually have undergone cardiac surgery as referred to in the invitation to participate letter). Secondly, due to the almost day case nature of the surgery, the patients waiting to undergo this type of surgery had a much shorter wait, and may not have always received their invitation letter until after they had undergone the procedure. However, it is not possible to assess the accuracy of either of these possible explanations. Differences between the two surgery type groups of those who did participate will be detailed at the end of this chapter, in order to investigate any possible implications this may have on the overall study. The demographics of the recruited participants will now be detailed.

8.3 Description of the sample

As can be gathered from the tables in the section above, the sample of 113 who agreed to participate was made up of 93 (82.3%) males and 20 (17.7%) females, with the bulk of these being referred from Chester (n=98, 86.7%) where recruitment was ongoing for longer. The majority of participants were undergoing the CABG (n=88, 77.9%) rather than the PTCA (n=15, 22.1%). Of these 113 participants, 22 (19.5%) initially agreed to participate in interviews and complete questionnaires (17 male and 5 female), with 91 completing questionnaires alone (80.5%, 73 male, 16 female).

Medical and demographic variables gathered from the participants themselves (history of past cardiac surgery, self-reported duration of cardiac problems) and from the Cardiothoracic Centre records (mean age at surgery, duration of angina, angina severity) are now reported for the overall sample and for the two genders.

As not all participants completed the initial questionnaire the previous cardiac surgery data was only available for 89 of the participants. Overall only 9 participants reported having undergone a cardiac procedure previously (6 males and 3 females), with 65 males and 15 females saying they had not previously undergone such a procedure. The data on self-reported duration of cardiac problems was available for 86 of the participants. Overall, they reported a duration range of 1 to 804 months (mean = 79.2 months, s.d.=120.56). For males the range was shorter (n=68, range = 1 to 324 months, mean = 70.35 months, s.d.=90.82), with females range being greater, with a consequent greater mean (n=17, range=2 to 804 months, mean=112.88 months, s.d.=202.70).

The age at surgery data was available for 109 of the participants (4 participants did not have surgery and were discharged from the waiting list), of these 88 were male and 21 female. Overall, the age at surgery ranged from 46 to 86 years, with a mean of 66.17 years, s.d.=8.93. The age ranges and mean age of the two genders were similar (males 49-86 years, mean=65.93, s.d.=8.59, females 46-80 years, mean=66.65, s.d.=10.44)

The duration of cardiac symptoms (specified as angina duration) was available for all but one patient from the Cardiothoracic Centre. The frequencies are given in table 8.4.

Table 8.4 Frequency of angina duration (%)

	Overall (n=112)	Males (n=91)	Females
None	25 (22.1%)	18 (19.8%)	7 (33.3%)
< 3 months	6 (5.3%)	4 (4.4%)	2 (9.5%)
3 – 6 months	7 (6.2%)	6 (6.6%)	1 (4.8%)
6 – 12 months	18 (15.9%)	15 (16.5%)	3 (14.3%)
1 – 5 years	34 (30.1%)	29 (31.9%)	5 (23.8%)
5 – 10 years	15 (13.3%)	12 (13.2%)	2 (9.5%)
>10 years	7 (6.2%)	6 (6.6%)	1 (4.8%)
Unknown	1 (0.9%)	1 (1.1%)	0 (0%)

As can be seen from the table females make up a greater proportion of those with either a short of no history of angina prior to surgery, and a smaller proportion of those with a long standing problem. The severity of the participants' cardiac problems was assessed using the Canadian Classification Society's scale (CCS, Grech, 2003b). The frequency distribution for this variable is given in table 8.5.

Table 8.5 Frequency distribution for cardiac severity - CCS (%)

Classification	Overall (%)	Male (%)	Female (%)
No angina	17 (15%)	15 (16.7%)	2 (9.5%)
Class I	12 (10.6%)	10 (11.1%)	2 (9.5%)
Class II	41 (36.3%)	30 (33.3%)	10 (47.6%)
Class III	29 (25.7%)	26 (28.9%)	3 (14.3%)
Class IV	9 (8%)	6 (6.7%)	3 (14.3%)
No data available	5 (4.4%)	3 (3.3%)	1 (4.8%)

8.4 Available and missing data

Of the 113 people who agreed to take part in the study, 5 either returned their consent forms after their operation had taken place or returned them so close to the operation date that their questionnaires did not reach them until after the surgery had taken place (4 patients filled their questionnaires in on the hospital ward just before surgery). A total of 17 participants did also not return their questionnaires at this stage, leading to a total of 91 total responses at this stage.

For the second assessment point (after surgery but before starting rehabilitation) 17 questionnaires were not returned. One questionnaire was also returned with no information but basic demographics filled in. Six patients also withdrew from the study due to ill-health or personal reasons at this stage, leading to 89 responses in total.

The next assessment point was at the end of cardiac rehabilitation. A total of 21 participants did not return their questionnaires at this stage and a further 3 participants withdrew due to poor health; this led to a total of 83 responses at this stage. There was a greater non-response at the final stage with 28 questionnaires not being returned, with a further patient withdrawing at this stage, leading to a total of 75 questionnaires being returned at the final stage (one-year post-surgery). Some of these non-responses were due to participants moving and not being traceable.

Even when questionnaires were returned, they were not always fully completed. In order to calculate subscale scores the IPQ-R scoring method, as published on the IPQ website (http://www.uib.no/ipq/) was used which allows for a small amount of missing data. There were no formal guidelines for the other two questionnaire measures (MacNew and CHIP), so a similar strategy as that for the IPQ-R was adopted for these.

For the 14 item subscales of the MacNew measure (physical and emotional quality of life) a minimum of 12 items needed to be present for the score to be calculated, with 11 items needed for the 13 item scale (social quality of life). For the four subscales of the CHIP measure 6 out of 8 items needed to be present. With these rules in place, there was still some missing data. After examination of the data file, it was decided that for 5 individual IPQ-R subscale scores (each for a separate participant) where they were very close to having the required number of responses (and all other IPQ-R data was present at that time point) mean substitutions should be made to boost the overall number of participants that could take part in the analysis. This was needed as all IPQ-R subscales needed to be scored for them to be included in the analysis. Overall 5 substitutions were made for the entire data set.

In total, 45 participants had data for the IPQ-R subscales at all four assessment points, 45 had data present for all stages of the CHIP, and 51 for all stages of the MacNew. However, combinations of data as needed for the analysis led to a decline in numbers, with 44 having data for all stages of the IPQ-R and MacNew, but only 41 having data for both these two measures and the CHIP. As detailed in section 8.2 there were a disproportionately greater number of declines to participate in the PTCA group than in the CABG group. The final section will now look at any differences between these two surgery types to assess whether this might have any bearing on the overall findings of the research.

8.5 Derivation of the IPQ-R cause subscales

For the present research the cause data collected at baseline was factor analysed using principal component analysis to derive relevant subscales in line with the procedure recommended by Moss-Morris et al (2002). Initial analysis indicated a 6 factor solution (all with eigenvalues greater than 1.1), but the scree plot seemed to indicate a 3 factor solution would be more appropriate, which also fitted in with the work of Moss-Morris and colleagues. The three variables and the questions they included are given in table 8.6, names for subscales were decided on from there content.

Table 8.6 Details of cause subscales for IPQ-R

Psychological attributions	**External factors**	**Behavioural risk factors**
Stress	Chance	Diet
Overwork	Poor immunity	Own behavior
Emotional	Accident	Smoking
Family	Ageing	Alcohol
Mental attitude	A germ or virus	
Poor medical care	Personality	
	Pollution	
	Heredity	

Cronbach’s alpha calculations were carried out for each subscale. For Psychological attributions Cronbach’s alpha was 0.79, however if poor medical care was excluded this improved to 0.81; for External factors Cronbach’s alpha was 0.57, which improved to 0.71 if heredity was excluded; and for Behavioural risk factors Cronbach’s alpha was 0.66. Therefore, heredity and poor medical care were removed from the relevant subscales and treated as separate items for all analysis.

8.6 Comparison of participants by surgery type

For an effective comparison of the two surgery types all data collected pre-surgery was used to compare the CABG and PTCA patients. In order for this to be a consistent analysis listwise deletion was used to ensure all participants had data for all these variables. This led to 78 participants, 63 CABG patients and 15 PTCA. Due to the uneven numbers of participants Mann-Whitney analysis was used. The medians for the two groups and the results of this analysis are given in table 8.7.

Table 8.7 Medians and Mann-Whitney results for the surgery type comparison

	CABG median	PTCA median	Mann- Whitney U (p)
Canadian Cardiovascular Society severity	Class II	Class II	438.5 (0.67)
Self-reported duration of cardiac problems	30 months	14 months	389.5 (0.30)
Cardiothoracic Centre measure of angina duration	6-12 months	< 3 months	327.0 (0.06)
Age at surgery	67	68	465.0 (0.93)
IPQ-R Identity	4	3	363.0 (0.16)
IPQ-R Timeline – acute/chronic	20	19	445.5 (0.74)
IPQ-R Timeline – cyclical	10	11.5	413.0 (0.45)
IPQ-R Consequences	22	21	359.0 (0.15)
IPQ-R Personal control	22	23.5	389.0 (0.29)
IPQ-R Treatment control	20	20	453.5 (0.81)
IPQ-R Illness coherence	20	20	413.5 (0.45)
IPQ-R Emotional representations	19	18	409.5 (0.43)
IPQ-R Psychological attributions	15	12.5	343.0 (0.10)
IPQ-R External factors	16	15	356.5 (0.14)
IPQ-R Behavioural risk factors	11	9.5	398.5 (0.35)
IPQ-R Heredity	4	4	412.5 (0.45)
IPQ-R Poor medical care	2	1	281.5 (0.01)**
CHIP Distraction	23.5	23	463.0 (0.91)
CHIP Palliative	25	24	414.5 (0.47)
CHIP Instrumental	31.5	32	459.0 (0.87)
CHIP Emotional preoccupation	22.5	18	292.0 (0.02)*
MacNew Emotional	4.68	5.57	273.0 (0.01)**
MacNew Physical	3.92	4.92	289.0 (0.02)*
MacNew Social	4.27	5.23	274.5 (0.01)*
Overall MacNew	4.50	5.29	268.0 (0.01)**

* = significant at 5% level ** = significant at 1% level

As can be seen from the table, both the self-reported duration of cardiac problems and the Cardiothoracic Centre's duration of angina symptoms indicated that the PTCA group had been affected for a shorter time than the CABG group. However, these differences were not significant. There were no significant differences between the two groups in terms of the severity of their angina as measured by the

CCS. While this does not fit with recommendations that more severely affected patients should undergo PTCA the lack of difference in severity between the groups undergoing the different procedures is partially explained by the fact that the choice of surgery type was decided by the referring cardiologist. Of the four cardiologists at the Countess of Chester two referred patients almost exclusively for PTCA and the other two consultants for CABG; this indicates that severity might not have been a deciding factor in these decisions.

There were no differences for the main IPQ-R variables, but on the cause variables there were trends towards the CABG group having a greater belief in psychological causes, such as stress, and behavioural risk factors, such as smoking. They were also significantly more likely to see their cardiac problems as having been contributed to by poor medical care than the PTCA surgery group.

The findings for the coping measure (CHIP) were similar for three of the four subscales, with the only difference being on the emotional preoccupation subscale. The CABG group were significantly more likely to use this as a coping strategy than the PTCA group. For the MacNew measure the CABG group had significantly poorer quality of life across all the domains. In summary, there are no differences in severity between the two groups, and few differences in IPQ-R or CHIP subscales, but were baseline differences in the outcome measure of quality of life, with the CABG patients, who make up the bulk of the participants, having a poorer quality of life prior to surgery. Therefore, the effects of initial quality of life dimensions will be controlled for when predicting quality of life at later stages.

In order to use as much of the available data as possible, the maximum participants for each analysis will be used in the following chapters, meaning that the actual number of participants varying both between and within the chapters.

Chapter 9: Changes in Illness perceptions, and coping over time

9.1 Introduction

This chapter plots the changes in the three main sets of data (IPs, coping strategies, and QoL) over the four data collection time points. These are the baseline point (stage one), prior to surgery; post-surgery but pre-rehabilitation (stage two); post rehabilitation (stage three); and one year post-surgery (stage four). For each of these sets of data the changes detailed will involve only those participants who have answered the relevant questions at all four time points. However, there will be different numbers of participants for the three different types of data (IPs, coping strategies and QoL), due to the differing number of responses for each questionnaire as detailed further in the preceding chapter. Initially, the data concerning the IPs data will be detailed, followed by the coping strategies data, then the QoL findings.

9.2 Changes in IPs over time

There are a number of subscales encompassed by the terminology of IPs. The majority of these follow the initial assignment of questions to subscales as defined by Moss-Morris and her colleagues in the original paper on the development of the Revised Illness Perceptions Questionnaire – IPQ-R (Moss-Morris et al., 2002). These subscales are *identity, timeline-acute/chronic, timeline-cyclical, consequences, personal control, treatment control, illness coherence,* and *emotional*. The other subscales were developed from the 18-item cause related questions on the IPQ-R by means of a factor analysis procedure (see chapter 8 for details of this analysis), and are concerned with what factors the patients attribute the development of their cardiac problems to. Within the cause related sub-area are three subscales: *psychological attributions*, *external factors,* and *behavioural risk factors.* There are also 2 items that did not relate to any of the 3 subscales sufficiently well (*heredity* and *poor medical care*) that will be treated as single item factors.

Table 9.1 details the changes in all the IP subscales. One factor that may underpin some of these findings, particularly at stage one, is how severely the patients' physical health is affected by their cardiac problems prior to surgery. This was assessed using data collected by the surgeons at The Cardiothoracic Centre shortly before surgery. While a variety of data was collected (see chapter 6) the measure used in this analysis was the Canadian Cardiovascular Society classification of angina (CCS, Grech, 2003b), as this is the preferred measure of severity in the most recent Scottish Intercollegiate Guidelines Network report (2007). This variable was added as a covariate to the repeated measures General Linear Model analysis. Where significant differences of at least $p<0.05$ overall are present they are signified by bold type and if present in paired samples analysis these are signified by the use of superscripts, with different means not sharing at least one letter being significantly different from each other. Where Mauchly's Test of Sphericity has indicated that sphericity has been violated the Greenhouse-Geisser correction has been applied, this is indicated by the asterix in front of the relevant subscale names.

9.1 Table of means of all IP subscales at each time point, indicating any significant differences, and giving a summary of subscale and interaction findings

Subscale	Possible range (midpoint)	Stage One	Stage Two	Stage Three	Stage Four	Interaction
Identity (n=52)	**0-14 (7)**	**3.65^{a}**	**3.14^{a}**	**2.07^{b}**	**2.17^{b}**	**Yes**
*Timeline – acute/chronic (n=52)	0-30 (15)	19.80^{a}	17.48^{b}	17.96^{b}	20.27^{a}	No
Timeline – cyclical (n=50)	0-20 (10)	10.54	10.10	9.60	10.68	No
Consequences (n=52)	**0-30 (15)**	**21.30^{a}**	**18.79^{b}**	**18.67^{b}**	**18.11^{b}**	**No**
*Personal control (n=52)	0-30 (15)	21.65^{a}	$23.54^{b,c}$	$23.04^{a,c}$	$22.42^{a,c}$	No
Treatment control (n=52)	**0-25 (13)**	**20.04^{a}**	**20.02^{a}**	**$19.10^{a,c}$**	**$18.42^{b,c}$**	**Yes**
*Illness coherence (n=51)	0-25 (13)	19.20	19.58	19.35	19.44	No
***Emotional representations (n=51)**	**0-30 (15)**	**18.38^{a}**	**15.55^{b}**	**14.63^{b}**	**15.28^{b}**	**No**
Psychological attributions (n=53)	0-25 (13)	14.81	14.62	14.74	14.98	No
External factors (n=53)	0-35 (18)	14.26	14.24	14.57	14.55	No
* Behavioural risk factors (n=53)	0-20 (10)	10.82	11.23	11.28	11.49	No
Heredity (n=50)	0-5 (2)	3.68	3.64	3.64	3.66	No
Poor medical care (n=54)	0-5 (2)	2.11	2.31	2.17	2.04	Yes

Comparing the mean values for the IPQ-R non-cause subscales with other published data provides some interesting comparisons. Findings for the identity variable differed most from other research, with the scores obtained being considerably lower than for post-MI and CABG patients about to undergo cardiac rehabilitation (Cooper et al., 1999; Whitmarsh et al., 2003). The scores obtained in the current research at stages one and two (pre-surgery and rehabilitation) are more similar to those of Type 2 diabetic patients in previous research (Searle, Norman, Thompson & Vedhara, 2007). However, at the later stages, identity scores dropped still further. Identity scores are a measure of symptom load – or more specifically of the symptoms experienced and associated with the condition of interest. Therefore, although the condition of patients in the present sample was considered serious enough to need invasive intervention in the form of either CABG or PTCA, the actual symptoms they reported as being associated with this were fairly low in number. One possible interpretation of these findings is that the patients' condition was currently well managed by their cardiac specialists and other medical professionals.

The findings here are similar to post-MI patients for both timeline variables (Alsen, Brink, Persson, Brandstrom & Karlson, 2010), but patients' in the present sample had a much greater belief in their condition being chronic rather than acute when compared with pre-CABG patients in another sample (Hermele, Olivio, Namerow & Oz, 2007). In terms of consequences the patients in this study had greater perceived consequences than other cardiac patients immediately before and after surgery (Alsen et al., 2010; Hermele et al, 2007), but post rehabilitation and at follow-up their consequences scores were similar to those seen in previous research.

The participants illness coherence scores in the present study were similar to those seen in other samples of CABG patients (Hermele et al., 2007), as were their emotional representation scores, but these were both higher than has been reported in post-MI patients (Alsen et al., 2010). However, personal and treatment control mean scores in the present study were much higher than participants in either of the previously mentioned cardiac studies. Overall, the participants in the present study seem to have reported fewer symptoms associated with their condition than other cardiac patients together with a greater sense of control. These findings may have implications for comparing them with other cardiac groups.

As can be seen from table 9.1 none of the subscales generated from the causes section of the IPQ-R differed from each other significantly at any of the four stages [Psychological attributions – F(3,153)=0.784, p=0.504; External factors – F(3,153)=1.648, p=0.181; Behavioural risk factors – F(2.554,130.250)=0.177, p=0.885; Heredity – F(3,144)=0.064, p=0.979; and Poor medical care –

F(3,156)=2.321, p=0.077]. Thus, indicating that the patients' views on the causes of their cardiac problems remained fairly constant across the entire time span of the project.

There were, however, significant differences for the Identity subscale (F(3,150)=2.847, p<0.040), the Consequences subscale (F(3,150)=3.685, p=0.013), Treatment control (F(3,150)=7.532, p<0.001), and Emotional representations (F(2.578,126.344)=6.165, p=0.001) as before. This indicates that the number of symptoms that the patients were associating with their cardiac problems significantly reduced after surgery and cardiac rehabilitation, which would be the hoped for outcome. Both the patients' emotional representations and the consequences their cardiac problems had for them were significantly reduced by undergoing their surgery; however their beliefs in the effectiveness of treatment control were also reduced. It should be noted, though, that for these last three variables that undergoing cardiac rehabilitation appears to have no effect. This finding will need to be clarified in chapter 12, as not all of the patients will necessarily have completed a course of cardiac rehabilitation. All other subscales of the IPQ-R had no significant differences overall between the time points {Timeline – acute/chronic [F(3,150) = 2.142, p=0.109], Timeline – cyclical (F(3,144)=1.515, p=0.213), Personal control [F(2.565, 128.250) =1.368, p =0.258], Illness coherence (F(2.576,126.206)=0.070, p=0.963)}. This indicates that the patients' views on how well they feel they understand their illness or are able to control it are unaffected by the surgery or rehabilitation process, and that their beliefs that their illness will vary in intensity over time or may last a long or short time are also fairly constant. However, for both the timeline – acute chronic and personal control subscales pairwise comparisons still indicated significant differences between certain time points. For timeline there is a significant fall in scores from pre-surgery to post-surgery and post-rehabilitation, but these significant differences then drop at the follow-up stage. For personal control there is a significant increase in scores post-surgery but again this significant improvement is lost at later stages though personal control is still slightly improved at the later stages compared to pre-surgery. The significant findings are displayed graphically overleaf.

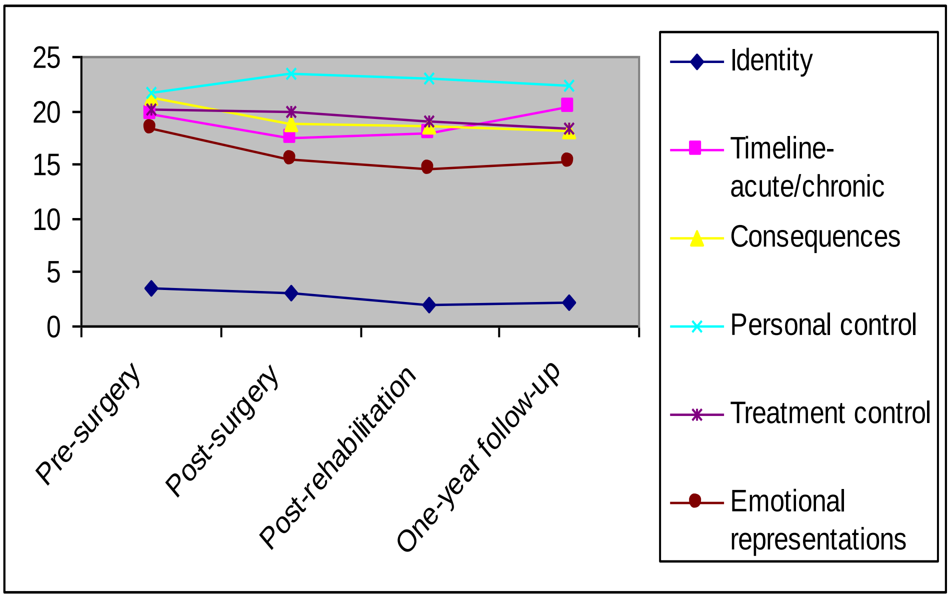

Figure 9.1 An illustration of the changes in means across the four time points for those IP variables with significant differences overall or at certain time points

Significant interactions were only found for three of the subscales. The first of these was Identity (F(3,150)=2.840, p=0.040). This subscale is fundamentally a count of related symptoms; therefore an increasing severity of the individual's cardiac problem would be expected to be related to an increased number of symptoms. However, examining the B values from the parameter estimates analysis indicates that the opposite is the case, with a negative relationship between identity and severity as measured by the CCS. This indicates that those with such established diseases may have their symptoms under control and thus not score heavily on such items, or, alternatively, that they have become accustomed to their symptoms and no longer attribute them to their cardiac condition. It should also be borne in mind, as discussed earlier, that the identity scores for this set of patients is particularly low. These B values are all small and this relationship is only significant for the final time point identity score (B=-0.987, p=0.006). Therefore, in this case it could be interpreted that by this final time point those individuals who were severely affected by their cardiac problems before surgery have seen a reduction in their symptoms due to the interventions they had experienced.

The second significant interaction was found for Treatment control and CCS (F(3,150)=2.928, p=0.036). The parameter estimate analysis indicated that this was a significant relationship, but this was only significant post-rehabilitation (B=0.950, p=0.003) and at one-year follow-up (B=0.817, p= 0.026). This implies that the more severely affected patients had more confidence in their treatment, particularly at the latter time points, indicating a perception of successful outcome post-rehabilitation.

The final significant interaction was found between the cause subscale Poor medical care and CCS (F(3,156)=2.897, p=0.037). Looking at the parameter estimates once more there is a negative, though non-significant finding, at the first time point, with the latter time points being positively related, implying that increased pre-surgical severity is related to individual's perception that poor medical care in the past led to their cardiac problems. However, this is only significant at time point three, post-rehabilitation (B=0.239, p=0.024), and such a small B value at just this point indicates this may just be a coincidental finding.

No other significant interactions were found [Timeline – acute/chronic – F(3,150)=0.181, p=0.879; Timeline – cyclical – F(3,144)=0.670, p=0.572; Consequences – F(3,150)=0.035, p=0.991; Patient control – F(2.565,128.250)=0.352, p=0.756; Illness coherence – F(2.576,126.206)=0.217,p=0.857); Emotional representations – F(2.578,126.344)=0.689, p=0.540; Patient attributions – F(3,153)=0.564, p=0.640; External factors – F(3,153)=2.497, p=0.062; Behavioural risk factors – F(2.554,130.250)=0.951, p=0.407; Heredity – F(3,144)=0.081, p=0.970]. The next section will examine how the patients chosen coping strategies varied over time.

9.3 Changes in the use of coping strategies over time

The patients' coping strategies were assessed using the Coping with Health Injuries and Problems (CHIP) scale (Endler, Parker, & Summerfeldt, 1998). This consists of four subscales: *Distraction, Palliative, Instrumental,* and *Emotional Preoccupation.* Table 12.3 details how the means of these four subscales varied across the four time points, there were 50 patients for each of the subscales who completed the CHIP at every stage. As in the previous section severity was also entered into the General Linear Model as a covariate.

Table 9.2 Table of means of all Coping subscales at each time point, indicating any differences and giving a summary of subscale and interaction findings

Subscale	Stage One	Stage Two	Stage Three	Stage Four	Interaction
Distraction	22.86	24.26	23.00	23.06	No
Palliative	**24.12^{c,d}**	**24.52^{a,c}**	**22.78^{b,d}**	**23.24^{c,d}**	**No**
*Instrumental	32.32	32.65	30.92	31.26	No
Emotional preoccupation	21.04^{a}	20.32^{a,c,e}	18.68^{b,d}	19.28^{b,e}	No

For Palliative coping (F(3,144)=3.409, p=0.094), there is a significant reduction in such coping strategies after cardiac rehabilitation which may indicate that they may indicate they are instead using strategies suggested during rehabilitation, but this change is not fully maintained, with a slight non-significant increase in such strategies at follow-up. The Emotional preoccupation subscale was non-significant overall (F(3,144)=2.130, p=0.099), there was a significant reduction after rehabilitation and at follow-up compared to before surgery, and also a significant reduction from before rehabilitation to after rehabilitation

There are no significant changes for the other two subscales {Distraction (F(3,144)=0.389, p=0.761) and Instrumental (F(2.383,114.365)=0.532, p=0.620)}. No significant interactions were found between the severity of the patients' cardiac problems prior to surgery and the coping subscales [Distraction – F(3,144)=1.052, p=0.372; Palliative – F(3,144)=1.292, p=0.280; Instrumental – F(2.383,114.365)=0.532. p=0.620; Emotional preoccupation – F(3,144)=0.356, p=0.785]. This implies that the severity of cardiac problems does not appear to affect the choice of coping strategies that the patients select. The findings for the coping variables are illustrated in figure 9.2.

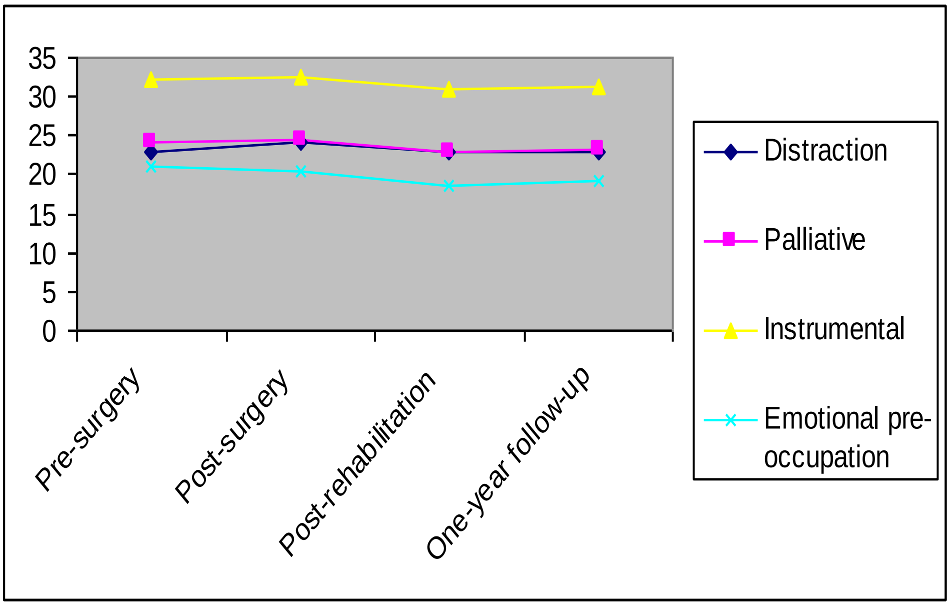

Figure 9.2 An illustration of the mean coping scores at each time point

It is interesting to note that the highest coping score is for the Instrumental subscale at all four time points, which may be a characteristic of the study population as a whole, as they may see taking part in this research as an instrumental strategy. So far, this chapter has examined variables that may be considered to be predictor variables, it is now time to turn to look at the outcome variables, QoL.

9.4 Changes in reported QoL over time

QoL is measured using the MacNew health-related quality of life measure (Valenti, Lim, Heller, & Knapp, 1996). This leads to three subscales that measure the three main domains of quality of life – *Emotional, Physical* and *Social*. Table 9.3 details how the means of these three subscales varied across the four time points, there were 56 patients for each of the subscales who completed the MacNew at every stage. As in the previous sections, severity was added as a covariate to the analysis; in addition in this case a second covariate was added. This was the surgery type (CABG or PTCA), in order to control for the differences in initial quality of life found between these two groups in the previous chapter. Of the 56 participants 43 underwent the CABG procedure and 13 PTCA.

Table 9.3 Table of means of all MacNew QoL subscales at each time point, indicating any differences and giving a summary of subscale and interaction findings

Subscale	**Stage One**	**Stage Two**	**Stage Three**	**Stage Four**	**Interaction with severity**	**Interaction with surgery type**
Emotion	4.79^{a}	5.15^{a,c}	5.54^{b}	5.37^{b,c}	No	No
***Physical**	**4.22**^{a}	**4.68**^{a}	**5.49**^{b}	**5.51**^{b}	**No**	**No**
***Social**	**4.38**^{a}	**4.72**^{a}	**5.62**^{b}	**5.61**^{b}	**No**	**No**

As can be seen from table 9.3 there are significant changes in QoL across the four time points for two of the subscales – Physical (F(2.409, 127.682)=3.689, p=0.021); and Social (F(2.419, 128.213)=3.387, p=0.020. For both of these there is a significant improvement in quality of life from prior surgery to after rehabilitation and follow-up, but no significant difference between pre and post-surgery, although all scores improve. There is no overall significant difference in the Emotion subscale – F(3,159)=1.133, p=0.338 – however, there are pairwise differences. For all the subscales there are significant improvements from pre-rehabilitation to post-rehabilitation, implying that rehabilitation may be an important part of the recovery process. This is illustrated in figure 9.3.

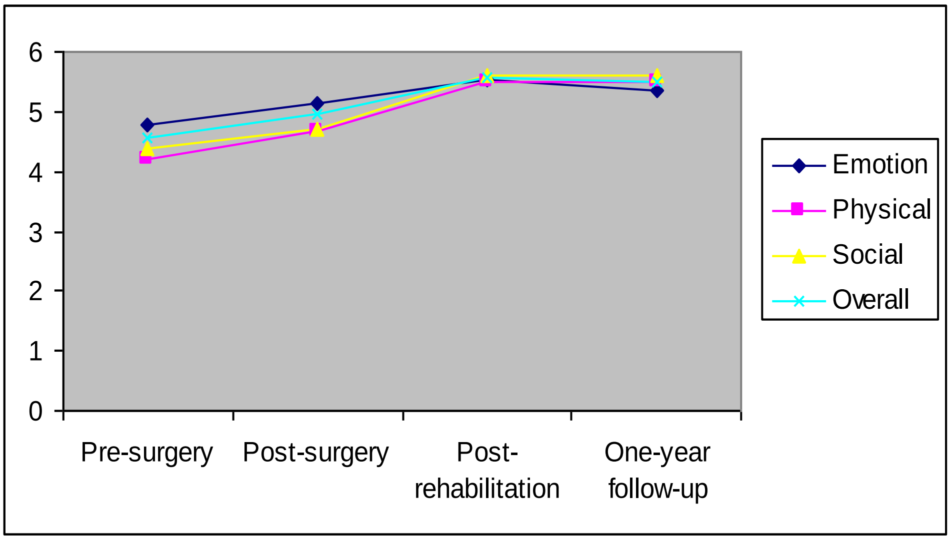

Figure 9.3 An illustration of changes in QoL over time

As with the covariate analysis using severity as measured by the CCS for the coping subscales there were no significant interactions for any of the quality of life subscales [Emotion - F(3,159)=1.942, p=0.125; Physical – F(2.409, 127.682)=1.607, p=0.199; Social – F(2.419, 128.213)=1.065, p=0.357]; implying that severity of cardiac problems pre-surgery does not appear to affect quality of life ratings.

The covariate analysis looking at the effect of surgery type also revealed no significant interactions [Emotion – F(3,159)=0.509, p=0.677; Physical – F(2.409, 127.682)=0.141, p=0.903; Social – F(2.419,128.213)=0.079, p=0.950]; implying that, in contrast to the findings in the previous chapter that surgery type does not influence changes in quality of life over the time spans studied. This may partially be due to the more restricted participant group in this analysis.

From the three sections detailed above there appears to be a common theme of improvements in some of the patients' perceptions of their cardiac problems, reductions in less useful coping strategies, and improvements in quality of life after surgery and rehabilitation, but these are not always maintaining the same positive trajectory at follow-up. This common pattern, together with the theoretical support for the CSM, implies that there may be a relationship between these variables. In particular, this research intends to assess whether IP's and coping strategies prior to surgery can predict QoL. The next chapter will begin to examine this premise. As there seems to be a small effect of severity of cardiac problems prior to surgery to certain IP variables, severity will also be examined as a contributing factor.

Chapter 10: IPs and coping strategies association with QoL

10.1 Introduction

This chapter will address two of the four hypotheses put forward in chapter five. These are: firstly that those with poorer personal control beliefs, more severe beliefs of the consequences of their cardiac problems, less understanding of their condition, and more negative emotional representations will have poorer quality of life. Secondly, it is expected that there will be associations between the less adaptive coping strategies (emotional preoccupation and distraction) and poorer quality of life, while those with better quality of life will endorse instrumental coping strategies. In particular, the predictive capabilities of the IP and coping variables pre-surgery on QoL at all time points are of interest. This part of the study will therefore examine the associations between IPs and coping subscales at stage one with QoL at all stages. In order to make comparisons across all the stages, only data from participants who completed all subscales at all four stages will be included; therefore, a total of 52 participants' data will be examined.

There are demographic and medical factors that may affect the associations between illness perceptions, coping and quality of life, so prior to carrying out the main analysis for this chapter the associations between all stage one IP, coping and QoL variables three medical and one demographic variable were found. The four medical/demographic variables were the Canadian Cardiovascular Society classification of angina (CCS, Grech, 2003b) as classified by the consultants at the Cardiothoracic Centre prior to surgery, the duration of their angina problems in months (taken from medical records), the duration of their cardiac problems in months (patient self-report) and the patients age at surgery (in complete years).

Illness perception variables were derived from the IPQ-R questionnaire (Moss-Morris et al., 2002), and consist of eight subscales derived from the main questionnaire and five factors derived from the cause related questions on the IPQ-R. The coping variables are the four subscales of the CHIP (Endler, Parker, & Summerfeldt, 1998), and the QoL variables are from the Macnew (Valenti, Lim, Heller, & Knapp, 1996). As data from the Cardiothoracic Centre was incomplete for two of the patients, only 50 participants were considered for this analysis. In this, and in subsequent analyses, where data were non-normally distributed, Spearman's two-tailed correlations were performed. In this and subsequent analyses, due to the multiple testing for associations a Bonferroni correction was applied in each case. For example, in this analysis, for the correlations looking at the IP variables (13 variables) the significance level was adjusted from 0.05 to 0.004, and for the coping and QoL variables (4 variables each) the significance level was adjusted to 0.0125. As such, this will reduce the likelihood of a Type I error being made by reducing the overall rate to 0.05 across all these comparisons. This means that any spurious findings should be reduced, so the certainty that associations between variables are important is increased. However, it does result in an increased likelihood of actual weak, but significant findings being ignored (a rise in Type II errors), therefore significant findings before the Bonferroni correction will also be discussed.

In the analyses presented next, and in all subsequent analyses, a single asterix indicates that the correlation is significant at the 5% level and two asterix indicate significance at the 1% level. Significance after the Bonferroni correction is applied is signified by bold type. The correlations are displayed in table 10.1.

Table 10.1 Spearman's correlations between baseline IP's, coping variables and QoL variables at baseline and demographic variables.

		Canadian Angina Score	*Self-reported duration of cardiac problems*	*CTC angina duration*	*Age at surgery*
IP variables	Identity	0.121	-0.109	0.218	-0.194
	Timeline – acute/chronic	-0.068	0.060	0.019	-0.057
	Timeline – cyclical	0.088	0.187	0.077	-0.072
	Consequences	-0.072	0.167	0.018	-0.313*
	Personal control	0.217	-0.009	0.076	-0.270
	Treatment control	0.267	0.074	0.304*	0.142
	Illness coherence	-0.047	0.126	0.017	-0.191
	Emotional representations	-0.185	0.005	-0.040	-0.125
	Psychological attributions	-0.015	0.222	0.117	-0.239
	External factors	-0.111	0.148	-0.033	0.161
	Behavioural risk factors	0.205	0.209	0.262	-0.329*
	Heredity	0.003	-0.005	0.070	-0.370**
	Poor medical care	-0.103	0.153	0.058	-0.196
Coping variables	Distraction	-0.218	-0.187	-0.070	-0.245
	Palliative	-0.106	-0.215	-0.050	-0.129
	Instrumental	-0.055	-0.287*	-0.058	-0.210
	Emotional preoccupation	-0.031	-0.002	0.193	-0.049
MacNew Quality of Life Variables	Emotional	-0.050	-0.094	-0.153	0.090
	Physical	-0.062	-0.093	-0.161	0.219
	Social	-0.013	-0.052	-0.076	0.205
	Overall	-0.046	-0.102	-0.146	0.163

From table 10.1 it can be seen that there are few significant correlations. The Canadian Angina score was not significantly correlated with any of the questionnaire variables, with especially low correlation coefficients for QoL, and none of the correlations meeting the moderate level of r=0.3 as defined by Cohen (1992). This indicated that severity of cardiac condition was not a factor that needed controlling for in further analysis. For the hospital recorded duration of angina, the only significant finding was that those with the longest duration were significantly more likely to have a high sense of treatment control, though this correlation only just reached a moderate level. For the patients' self-reported duration there was also only a single significant finding – a longer history of cardiac problems was negatively associated with instrumental coping mechanisms, though this was only at a small effect level (Cohen, 1992). The age at surgery variable was significantly correlated with three of the questionnaire variables, with greater age associated with lower reporting of consequences of cardiac problems; and less belief in heredity factors or behavioural risk factors having caused their cardiac problems, these all satisfied Cohen's moderate level of effect, but only just. However, while there are some significant findings at both the 5% and 1% level, there are no significant findings once the Bonferroni correction is applied. Therefore, taking together the relatively low effect sizes, and the fact that they are no longer significant once the Bonferroni correction is applied, these four demographic and medical variables will not be included in further analysis in this chapter. The main analysis, looking at any possible predictive relationship between baseline IPs and coping variables and QoL at all stages will now be presented.

Initially, Spearman's one-tailed correlations with Bonferroni corrections, will be reported for each of the four stages. Significant correlations remaining after this correction will then be entered into regressions to examine the relationship between the relevant IP and coping subscale variables and the QoL measures. By only using correlations that are significant at this level it also implies that only those variables correlated at a greater effect level will be included in the secondary regression analyses. Where more than one IP or coping variable is present in the final regression model, tolerance and VIF statistics will be reported. This will allow the possible effect of multiple variables entering regression analyses (that is effects on collinearity) to be assessed. The following section will look at the associations between the variables at stage one, pre-surgery.

10.2 An examination of possible associations between IP and coping variables and QoL pre-surgery.

Associations between the baseline IP and coping variables and QoL at baseline are displayed in table 10.2

Table 10.2 Spearman's correlations between baseline IP's and coping variables and QoL variables at baseline.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	-0.237*	**-0.370***	-0.196
	Timeline – acute/chronic	-0.160	-0.127	-0.075
	Timeline – cyclical	**-0.377****	**-0.444****	-0.340**
	Consequences	**-0.505****	**-0.577****	**-0.610****
	Personal control	0.324**	0.346**	0.276*
	Treatment control	0.181	0.124	0.139
	Illness coherence	0.127	-0.002	-0.016
	Emotional representations	**-0.538****	**-0.510****	**-0.538****
	Psychological attributions	**-0.410****	-0.306*	-0.250*
	External factors	-0.010	-0.047	-0.035
	Behavioural risk factors	-0.241*	-0.257*	-0.149
	Heredity	-0.008	0.072	0.021
	Poor medical care	-0.199	-0.201	-0.158
Coping variables	Distraction	-0.165	-0.160	-0.131
	Palliative	**-0.520****	**-0.583****	**-0.560****
	Instrumental	0.154	0.006	-0.004
	Emotional preoccupation	**-0.556****	**-0.508****	**-0.554****

For eight of the IP variables and 2 of the coping variables there is at least one significant correlation with a QoL variable. However, many of these are weak correlations. For all QoL subscales, QoL increases if fewer symptoms are reported, as would be expected; however, identity is only correlated at a moderate level with the physical QoL sub-scale. The timeline-cyclical variable is significantly moderately negatively correlated with all the QoL variables. However, once the Bonferroni correction is applied the significant association between QoL social and timeline-cyclical disappears. For both the consequences and personal control variables there are significant correlations with all the QoL variables. These are of a low to moderate level for personal control, such that those patients who feel more in control of their cardiac problems also have a higher QoL; these significant correlations are lost though once the Bonferroni correction is applied. The correlations between consequences and QoL are stronger; patients who see their illness as having more serious consequences on their day-to-day lives also report lower QoL. The emotional representations variable is also strongly correlated with all the QoL domains, showing that those who report more emotional effects due to their cardiac problems also have lower reported QoL. Of the subscales generated from the causes questions from the IPQ-R the psychological attributions scale is the only one correlated with all the QoL variables; though the strength of these varies, with the strongest correlation, and the only one that remains significant once the Bonferroni correction is applied, being with the emotion MacNew subscale. The only other cause subscale with significant findings is the behavioural risk factors subscale, though these were only at a weak level and, as with the identity variable, there was no significant association with the social QoL subscale. This significant finding is also lost once the Bonferroni correction is applied. These negative correlations show that those patients who attribute the development of their cardiac problems to psychological factors such as stress and personality, or their own behavioural ‘errors’, such as smoking or poor diet, also have poorer QoL. The two significantly correlated coping subscales are palliative and emotional preoccupation, which are both strongly negatively correlated with QoL. This means that those patients reporting high use of these two strategies are also more likely to have poorer QoL.

As the IP and coping variables are themselves inter-correlated, to investigate which of them are significant independent predictors of QoL, a series of stepwise regressions were carried out. All variables entered were at least of a moderate effect size, and in the majority of cases had a large effect size ($r=0.5$ or more, Cohen, 1992). All significant IP variables were input as the first block for each QoL variable, with significant coping variables input as the second block. The first QoL variable analysed was the MacNew emotional domain. Four models were generated. The first model entered the IP emotional representations variable ($F(1,50)=20.372$, $p<0.001$; adjusted R square = 0.275); the second model generated added the IP consequences variable ($F(2,49)=14.899$, $p<0.001$, R square change = 0.078); the third model added the IP psychological attributions variable ($F(3,48)=12.371$, $p<0.001$; R square change = 0.048); and the final model added the coping variable palliative coping ($F(4,47)=13.062$, $p<0.001$; R square change = 0.085). All of the other significantly correlated IP and coping variables were excluded from the regression analysis. This final model accounted for almost 50% of the variance in the MacNew emotion variable. Despite the small number of participants and the multiple variables in the final model collinearity analysis indicated no issues (average VIF=1.35, minimum tolerance=0.629, Durbin-Watson=2.258). Final beta values and significance are given in table 10.3.

Table 10.3 Final beta and significance results for pre-surgery MacNew emotion regression analysis

Stage One IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.163	0.204
IP consequences	-0.252	0.033
IP psychological attributions	-0.313	0.006
Coping palliative	-0.352	0.004

The same procedure was followed for pre-surgery MacNew physical QoL. Four models were generated. The variable entered into the first model was IP consequences (F(1,50)=24.974, p<0.001; adjusted R square = 0.320); the second model added IP identity (F(2,49)=19.773, p<0.001; R square change =0.104); the third added IP emotional representations (F(3,48)=16.028, p<0.001; R square change = 0.045); and the final model added palliative coping (F(4,47)=15.372, p<0.001; R square change = 0.061). All of the other significantly correlated IP and coping variables were excluded from the regression analysis. The IP and coping variables in the final model accounted for 53% of the variance in the MacNew physical variable pre-surgery. For the final model, the collinearity statistics were average VIF=1.188, minimum tolerance =0.754 and Durbin-Watson=1.932). The final beta and significance values are given in table 10.4 below.

Table 10.4 Final beta and significance results for the pre-surgery MacNew physical regression analysis

Stage One IP and coping variable added	*Beta*	*Significance*
IP consequences	-0.383	0.001
IP identity	-0.234	0.024
IP emotional representations	-0.159	0.174
Coping palliative	-0.305	0.010

This procedure was then followed for pre-surgery MacNew social. This generated three models. As was the case with physical pre-surgery QoL, the variable entered into the first model was IP consequences (F(1,51)=29.702, p<0.001; adjusted R square = 0.356), and the second added IP emotional representations (F(2,50)=21.395, p<0.001; R square change = 0.084). The third model added palliative coping (F(3,49)=18.906, p<0.001; R square change = 0.068). Almost 51% of the variance in MacNew social at the pre-surgery stage was explained by these three IP and coping variables, similar to the other QoL domains already reported. In this final model average VIF = 1.336, minimum tolerance=0.709, and Durbin-Watson=1.894. The final beta and significance values are shown in table 10.5.

Table 10.5 Final beta and significance results for the pre-surgery MacNew social regression analysis

Stage One IP and coping variable added	*Beta*	*Significance*
IP consequences	-0.401	0.001
IP emotional representations	-0.218	0.065
Coping palliative	-0.316	0.007

10.3 An examination of possible associations between initial IP and coping variables and QoL post-surgery

The correlational analysis between the baseline IP and coping variables and the QoL variables at stage two, post-surgery can be seen in table 10.6.

Table 10.6 Spearman's correlations between baseline IP's and coping variables and QoL post-surgery.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	-0.211	-0.301*	-0.276*
	Timeline – acute/chronic	-0.129	-0.137	-0.098
	Timeline – cyclical	-0.270*	-0.241*	-0.159
	Consequences	-0.262*	-0.195	-0.221
	Personal control	0.201	0.169	0.187
	Treatment control	0.270*	0.269*	0.268*
	Illness coherence	0.057	0.084	0.035
	Emotional representations	-0.321*	-0.288*	-0.287*
	Psychological attributions	-0.258*	-0.151	-0.103
	External factors	0.062	0.009	0.021
	Behavioural risk factors	-0.144	-0.278*	-0.138
	Heredity	-0.091	-0.192	-0.186
	Poor medical care	-0.206	-0.166	-0.173
Coping variables	Distraction	-0.159	-0.263*	-0.244*
	Palliative	**-0.460****	**-0.448****	**-0.451****
	Instrumental	0.115	0.101	0.051
	Emotional preoccupation	**-0.351****	-0.247*	**-0.314***

The identity variable was significantly negatively correlated for two of the three QoL variables, with only the correlation with emotional QoL being non-significant. The largest correlation was between the number of symptoms initially reported and the physical QoL subscale, but this only represents a moderate effect size. The cyclical timeline variable was again significantly negatively correlated with the QoL variables, but not the social subscale in this instance, and these were only weak correlations (Cohen, 1992). The consequences correlations were lower for this analysis, with only emotion being significant, again this was only a weak correlation.. Initial personal control was not significantly correlated at all at this stage; however, treatment control was significantly positively correlated across all the QoL variables, but only weakly. Emotional representations were again significantly negatively correlated across all the QoL domains, but these correlations were weaker than at the pre-surgery stage, with only the correlation with social QoL reaching a moderate size. The cause subscales of psychological attributions and behavioural risk factors were significantly correlated, but for each case it was for one of the QoL variables only - emotion for the psychological attributions subscale and physical for the behavioural risk factors, and only a weak correlation in both cases. However, all of the IP variable correlations were not significant once the Bonferroni correction was applied.

Three of the coping variables were significantly correlated with the QoL variables. For the palliative and emotional preoccupation variables these were significant negative correlations across all QoL variables as in the previous analysis, and all but the correlation between emotional preoccupation and physical QoL being at a moderate level. For the distraction variable weak significant negative correlations were found only for the physical and social QoL variables. These findings mean that relying more heavily on certain coping strategies is associated with a poorer outcome post-surgery. Once the Bonferroni correction was applied the correlations with the distraction variable became non-significant, as did the emotional preoccupation and physical QoL correlation.

As with the pre-surgery correlations, significant coping variables once the Bonferroni correction was applied were entered into a series of multiple or linear regression analyses for each post-surgery QoL variable in turn. However, due to the findings in chapter 8 where differences were found in initial QoL between the two surgery types, the first block entered into the analysis was the relevant pre-surgery QoL variable , with the second block being the relevant coping variables. The first QoL variable analysed was MacNew emotion, so in this case the first block was the pre-surgery MacNew emotion variable, and the second block contained the palliative and emotional preoccupation coping variables. This generated a single model. The variable entered was pre-surgery emotional QoL(adjusted R square = 0.318, F(1,50) = 21.981, p<0.001). The palliative and emotional preoccupation coping variables were both excluded. This model accounted for 32% of the variance in post-surgery MacNew emotion. The final beta and significance values were: Beta = 0.577, p<0.01.

The MacNew physical variable then examined. Only one variable, palliative coping, was significantly correlated with it, so only this and pre-surgery physical QoL were entered into the regression. Again, the coping variable was excluded from the model, with only pre-surgery physical QoL being entered into the model (adjusted R square = 0.120, F(1,50) = 7.116, p=0.011). The final beta and significance values were: Beta = -0.373, p=0.011.

Turning to the MacNew social regression analysis, this also generated a single model. The only variable entered was the pre-surgery social QoL, (adjusted R square = 0.112, F(1,50) = 6.676, p=0.013). Both coping variables were excluded from the analysis. The final beta and significance values were: Beta =-0.363, p=0.013.

10.4 An examination of possible associations between initial IP and coping variables and QoL post-cardiac rehabilitation

The correlational analysis for post-cardiac rehabilitation, can be seen in table 10.7.

Table 10.7 Spearman's correlations between baseline IP's and coping variables and QoL post-cardiac rehabilitation.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	-0.104	-0.306*	-0.166
	Timeline – acute/chronic	-0.171	-0.033	0.009
	Timeline – cyclical	**-0.444****	**-0.553****	**-0.469****
	Consequences	-0.350**	-0.296*	-0.313*
	Personal control	0.325**	0.361**	**0.393****
	Treatment control	0.192	0.087	0.104
	Illness coherence	0.131	0.163	0.145
	Emotional representations	**-0.454****	**-0.501****	**-0.445****
	Psychological attributions	**-0.445****	-0.360**	-0.264*
	External factors	-0.026	-0.192	-0.146
	Behavioural risk factors	-0.053	-0.185	-0.051
	Heredity	0.042	-0.055	-0.002
	Poor medical care	-0.180	-0.208	-0.200
Coping variables	Distraction	-0.186	-0.291*	-0.217
	Palliative	**-0.391****	**-0.463****	**-0.410****
	Instrumental	0.148	0.105	0.100
	Emotional preoccupation	**-0.512****	**-0.495****	**-0.523****

These findings were more similar to those reported pre-surgery, with correlation coefficients between QoL and IP and coping variables generally proving weaker than at the pre-surgery stage, but with similar patterns of associations between variables. As in the previous analyses significant negative correlations were reported across all the QoL domains for the timeline cyclical, consequences, and emotional representations variables. The consequences variable was not significantly correlated with QoL once the Bonferroni correction was applied, and these correlations were only at a weak to moderate level. As at the pre-surgery stage the initial personal control variable was significantly positively correlated across all the QoL domains, again these were all at a moderate level, though only the correlation with the social QoL domain remained once the Bonferroni correction was applied. In this case, the identity variable was only significantly negatively correlated with the physical QoL variable, and this was not significant once the Bonferroni correction was applied. For the cause derived subscales only the psychological attributions variable was significantly correlated with the QoL variables. These were negative correlations of a weak to moderate level across all domains, with only the correlation with the emotional QoL domain being significant after the Bonferroni correction. As at the post-surgery time point significant negative correlations were found for three of the four coping subscales – distraction, palliative and emotional preoccupation. For the palliative and emotional preoccupation variables these were across all the QoL domains, and of a moderate to strong level, and remained significant once the Bonferroni correction was applied. For the distraction variable the only significant correlations was for the physical QoL variable, and this weak correlation was not significant once the Bonferroni correction was applied.

Again, the significantly correlated IP and coping variables were entered into regressions for each post-rehabilitation QoL variable. As before initial (pre-surgery) QoL was controlled for by entering this in the first block, IP variables in the second block, and coping variables in the third block. The analysis for the MacNew emotion variable generated two models. The first variable entered was pre-surgery emotional QoL (F(1,51)=65.917, $p<0.001$; adjusted R square = 0.511), followed by IP psychological attributions (F(2,50)=38.555, $p<0.001$; R square change = 0.037). All other significantly correlated variables were excluded. Durbin-Watson=1.772, average VIF=1.22, and minimum tolerance was 0.691. Final beta and significance values are given in table 10.8.

Table 10.8 Final beta and significance results for the post-cardiac rehabilitation MacNew emotion regression analysis

Stage One QoL, IP and coping variable added	*Beta*	*Significance*
Pre-surgery MacNew emotion	0.620	P<0.001
IP psychological attributions	-0.230	0.018

This analysis was then repeated for the post-rehabilitation MacNew physical variable. This also generated two models. The first variable entered was pre-surgery physical QoL (F(1,51)=32.159, p<0.001; adjusted R square = 0.331), followed by IP emotional representations (F(2,50)=20.081, p<0.001; R square change = 0.046). All other significantly correlated baseline IP and coping variables were excluded. The two variables entered accounted for 38% of the variance in the MacNew physical variable. Final beta and significance values were Pre-surgery physical QoL, Beta = 0.458, p<0.001, Pre-surgery emotional representations, Beta = -0.268, p=0.021. Durbin-Watson=1.653, minimum tolerance = 0.775, and average VIF=1.290.

Next, the regression analysis was repeated for the MacNew social variable. This generated three models. The first variable entered was pre-surgery Social QoL (F(1,51)=29.719, p<0.001; adjusted R square = 0.313), followed by IP personal control (F(2,50)=20.889, p<0.001; R square change = 0.082), and finally the emotional preoccupation coping variable (F(3,49) = 16.188, p<0.001; R square change=0.041). All other significantly correlated IP and coping variables were excluded. The three variables entered accounted for 42% of the variance in the MacNew social dimension. Durbin-Watson=1.828, minimum tolerance= 0.673, average VIF=1.345. The final beta and significance variables are given in table 10.9.

Table 10.9 Final beta and significance results for the post-cardiac rehabilitation MacNew social regression analysis

Stage One QoL, IP and coping variable added	*Beta*	*Significance*
MacNew Social	0.373	0.002
IP personal control	0.254	0.014
Emotional preoccupation	-0.246	P=0.039

10.5 An examination of possible associations between initial IP and coping variables and QoL at one-year follow up

The final correlational analysis compares the pre-surgery IP and coping variables with the QoL variables at the one-year follow up.

Table 10.10 Spearman's correlations between baseline IP's and coping variables and QoL at one-year follow-up.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	-0.181	-0.273*	-0.126
	Timeline – acute/chronic	-0.081	-0.074	-0.024
	Timeline – cyclical	-0.333**	**-0.466****	-0.359**
	Consequences	-0.358**	**-0.372****	**-0.432****
	Personal control	0.189	0.231*	0.210
	Treatment control	0.311*	0.265*	0.270*
	Illness coherence	0.027	0.074	0.012
	Emotional representations	**-0.424****	**-0.522****	**-0.528****
	Psychological attributions	-0.293*	-0.360**	-0.247*
	External factors	-0.030	-0.157	-0.042
	Behavioural risk factors	-0.127	-0.237*	-0.110
	Heredity	-0.069	-0.093	-0.069
	Poor medical care	-0.344**	-0.341**	-0.297*
Coping variables	Distraction	-0.177	-0.243*	-0.199
	Palliative	**-0.477****	**-0.468****	**-0.467****
	Instrumental	0.187	0.193	0.179
	Emotional preoccupation	**-0.478****	**-0.446****	**-0.525****

The correlations between the coping subscales and QoL dimensions were almost identical at one-year follow up as at the post-cardiac rehabilitation stage, though the correlation coefficients were a little larger. The moderate correlations for the palliative and emotional preoccupation variables remained once the Bonferroni correction was applied. The pattern of correlations between IP variables and QoL was slightly different than at the previous time points for some variables. The initial personal control variable was only significantly positively correlated for physical

QoL, and this was a weak correlation. Treatment control was again significantly positively correlated with all QoL variables, as at the post-surgery time point, though generally weakly. For the first time the cause item of poor medical care was significantly negatively correlated with QoL. These were moderate correlations except for the social QoL variable. This means that those patients who strongly endorsed the view that poor medical care in their past was a cause of their cardiac problems were also more likely to have a poor outcome at the one-year follow up. However, none of the IP findings discussed so far remained significant once the Bonferroni correction was applied. For the other IP variables the findings were similar to the findings at previous time points. Significant negative correlations were reported across all the QoL variables for the timeline cyclical, consequences and emotional representation variables. All of these were moderate to strong correlations. Once the Bonferroni correction was applied the significant correlation with timeline cyclical only remained for the physical QoL domain, and the consequences and emotional QoL correlation also became non-significant. Of the causes subscales the psychological attributions variable was significantly negatively correlated across all the QoL variables, though in this case only the physical and overall variables were of a moderate level. The behavioural risk factors variable was significantly negatively correlated with the physical QoL variable. Again, these significant correlations were lost once the Bonferroni correlation was applied.

As at previous time points, significantly correlated pre-surgery IP and coping variables were entered into regressions for each one-year follow up QoL variable in turn, with the relevant pre-surgery QoL variables being entered into the regression analyses in the first block, significant IP variables in the second block, and significant coping variables in the third block. The first QoL variable analysed was MacNew emotion, which generated a single model. The only variable entered was Pre-surgery emotional QoL (F(1,50)=61.160, p<0.001; adjusted R square = 0.497). All other significantly correlated IP and coping variables were excluded. The final beta and significance variable was Beta =-0.710, p<0.001.

This procedure was then repeated for MacNew physical, again generating a single model. The only variable entered was Pre-surgery physical QoL (F(1,50)=48.458, p<0.001; adjusted R square = 0.438). All IP and coping variables were excluded from the model. The final beta and significance values was Beta =-0.668, p<0.001

The regression analysis was then repeated for the one-year follow up MacNew social variable. Two models were generated. The first variable entered was Pre-surgery social QoL (F(1,51)=49.427, p<0.001; adjusted R square = 0.443), followed by the coping variable emotional preoccupation (F(2,50) = 28.354, p<0.001; R square change = 0.038). All the other IP and coping variables entered were excluded from the analysis. The final beta and significance values were: Pre-surgery social QoL Beta = 0.531, p<0.001, emotional preoccupation Beta = -0.241, p=0.039. For the final regression model the minimum tolerance = 0.659, average VIF=1.517, Durbin-Watson=2.291.

10.6 Summary and preliminary discussion of findings

In order to make the findings of this chapter clearer, a summary table (table 10.11) is presented overleaf that indicates which baseline IP and coping variables figure in the QoL regression analyses at each time point. The four time points are indicated numerically, with 1=baseline/pre-surgery, 2=post-surgery/pre-rehabilitation, 3= post-rehabilitation, and 4=one-year follow-up. The use of bold type indicates the first variable to be entered into the regression analysis at each time point, this variable also has the corresponding greatest adjusted R square value.

Table 10.11 Overall summary of predictive relationships between baseline IP, coping and QoL variables and QoL at each time point

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity		1	
	Timeline – acute/chronic			
	Timeline – cyclical			
	Consequences	1	**1**	**1**
	Personal control			3
	Treatment control			
	Illness coherence			
	Emotional representations	**1**	1**, 3**	1
	Psychological attributions	1, 3		
	External factors			
	Behavioural risk factors			
	Heredity			
	Poor medical care			
Coping variables	Distraction			
	Palliative	1	1	1
	Instrumental			
	Emotional preoccupation			3, 4
Pre-surgery QoL	Emotional	**2, 3, 4**		
	Physical		**2, 3, 4**	
	Social			**2, 3, 4**

As can be seen from the correlation findings reported in this chapter it is clear that there is an influence of the patients initial IP and coping variables on QoL at all time points. However, the detail of these varies for each stage, and the associations and relationships were much less pronounced post-surgery compared to the other three time points. There were some consistent findings across all the stages. In general, examining the correlational analysis, those patients who saw their cardiac problems as more episodic reported significantly lower QoL. Higher (more negative) emotional representations of their illness pre-surgery were also associated with lower QoL. For the coping subscales, the greater the reported use of palliative and emotional preoccupation strategies the lower the reported QoL.

The regression analyses produced less consistent findings over time in terms of the IP and coping variables. However, at the latter stages it was clear that pre-surgery QoL was a strong (and in many cases the only) predictor of later QoL. The variance in QoL predicted by the initial IP and coping variables was highest at pre-surgery, with only 3 of the IP variables and one coping variable predicting aspects of QoL post-rehabilitation and at one-year follow-up. Specifically, pre-surgery personal control predicted social QoL post-rehabilitation. Emotional representations predicted physical QoL post-rehabilitation, while psychological attributions predicted emotional QoL at the same time point. The coping variable emotional preoccupation predicted social QoL post-rehabilitation and at one-year follow-up. In all these cases, these IP and coping variables increased the total variance accounted for by a small amount, with the bulk of the variance at follow-up across all domains of QoL and all time points being explained by the pre-surgery QoL.

This emphasises the importance of the pre-surgery predictors of QoL. Looking at these more closely there are three variables that predict all domains of QoL, consequences, emotional representations and palliative coping. For emotional QoL emotional representations predict the greatest variance (28%) which is to be expected as it is the IP variable most likely to overlap with this domain of QoL. For both physical and social QoL the greatest variance is explained by the consequences variable (32% for physical and 26% for social QoL), which again, could be due in part to overlap of constructs. However, pre-surgery consequences did not appear as a predictor at any of the later stages, unlike previous research (Petrie, Weinman, Sharpe & Buckley, 1996). Interestingly, across all domains of QoL the emotional representations variable is not a significant predictor in the final model, implying it may be driven by other factors and variables, or that it overlaps with other variables in the model. As the initial QoL is the major predictor of QoL at later stages it would seem to imply that poor psychological functioning prior to surgery and the coping strategies driven by such emotional representations should be addressed pre-surgery in order to improve outcome. These findings are in line with work by Panagopoulou et al. (2006) who found that poor pre-operative psychosocial functioning, as measured by the PANAS (more usually used as a measure of affect), was associated with poor QoL 1 month and 6 months post CABG. Ulvik et al. (2008) also suggested that the use of confrontational coping strategies was associated with better outcome QoL, so trying to change the coping strategies used by patients prior to surgery may be a particular area to focus on.

Looking in particular at the two hypotheses that are being investigated by the analysis in this chapter it seems there is only partial support for them. Firstly, the hypothesis that those with poorer personal control beliefs, more severe consequences, poorer understanding of their condition (lower illness coherence), and more negative emotional representations will have poorer QoL will be examined. It can be seen that illness coherence has no effect at any stage. Personal control, while found to be predictive of QoL by others (Aalto et al, 2006), is predictive only of social QoL post-rehabilitation. A belief in more severe consequences was only predictive of QoL pre-surgery in contrast to previous research (Aalto et al., 2006; French, Lewin, Watson & Thompson, 2005); however it should be noted that both these studies collected data post-surgery or MI which may explain the difference in findings here. While pre-surgery emotional representations were good predictors of all domains of QoL pre-surgery, the only post-surgery QOL domain they predicted was physical QoL post-rehabilitation.

Turning to the second hypothesis, it was expected that poorer QoL would be associated with the use of emotional preoccupation and distraction as coping strategies, while better QoL would be associated with the use of instrumental coping. While both palliative coping and emotional preoccupation were significantly negatively correlated with all domains of QoL pre-surgery at a moderate level, only palliative coping entered the regression analysis, where it predicted all domains of QoL. However, the findings at post-surgery were different, with no pre-surgery coping variable predicting QoL post-surgery, and emotional preoccupation predicting social QoL post-rehabilitation and at one-year follow-up. Pre-surgery instrumental coping was not significantly associated with QoL at any time point. These findings, taken together with the finding of the predictive role of emotional representations, indicates that the emotional representations aspect of the CSM, and emotion regulation coping strategies, may have a more important role to play in determining ongoing QoL than the cognitive representations contained within the model.

Overall these findings imply that the effects of the initial IP and coping variables do not fully explain the variance in later QoL, and that there must be other factors to consider. Some of the possible medical factors that might have been thought to contribute to QoL were explored in the initial correlations in table 10.1 and were found to not relate to the questionnaire variables reported in this chapter, implying that there must be other psychological or social factors affecting the patients QoL that are beyond the remit of this research. The lack of a consistent pattern of predictors implies that associations between pre-surgery CSM variables and QoL differ at the different time points. This will be investigated in the following chapter, which examines the cross sectional associations between IPs, coping and QoL at each time point. These analyses will indicate whether there are any common inter-relationships between the three groups of questionnaire measures (IPs, coping and QoL) across the four time-points, allowing for a wider understanding of the role of the cognitive and emotional representations of illness for this set of patients, as well as allowing comparison with other research.

Chapter 11: The inter-relationships between IP's, coping strategies and QoL at the different time points

11.1 Introduction

The previous chapter looked at the predictive power of baseline IP's and coping variables on QoL at all the research time points (baseline, post-surgery, post-cardiac rehabilitation and one-year follow-up). The findings from these analyses differed from some of the previous research in this area (Aalto et al., 2006; Stafford, Berk & Jackson, 2009). As postulated in chapters 3 and 4, differences in findings between studies may be due to the timings of the data collection. The present chapter aims to shed light on this possibility by examining the associations between the illness perceptions, coping and QoL at each time point in a series of cross-sectional analyses. Changes in all three sets of variables over time (chapter 9) showed improvements until post-rehabilitation, with a small drop off after this. Broadly speaking, all three sets of variables change together.

Specifically, this chapter will address two of the four hypotheses put forward in chapter five. Firstly, that those with poorer personal control beliefs, more severe beliefs of the consequences of their cardiac problems, less understanding of their condition, and more negative emotional representations will have poorer quality of life. Secondly, it is expected that there will be associations between the less adaptive coping strategies (emotional preoccupation and distraction) and poorer quality of life, while those with better quality of life will endorse instrumental coping strategies.

As in the previous chapter the IP variables are derived from the IPQ-R questionnaire (Moss-Morris et al., 2002); the coping variables from the CHIP (Endler, Parker, & Summerfeldt, 1998); and the QoL variables from the Macnew (Valenti, Lim, Heller, & Knapp, 1996). In order to get the most accurate indication of the associations between these variables the full available data will be used at each time point (pre-surgery n= 82, post-surgery n= 75, post-rehab, n= 71, and one-year follow-up n=68).

11.2 An examination of the possible associations between initial IP, coping variables and QoL for the full data set

As in the last chapter initially Spearman's correlations were performed on the data, and due to the multiple comparisons being made a Bonferroni correction was applied, leading to a significance level of 0.004 for the correlations with the IP variables, and a significance level of 0.0125 for the coping variables. The same conventions also apply for the report of significance of correlations. The pre-surgery (baseline) correlations are given in table 11.1.

Table 11.1 Spearman's correlations between baseline IP's, coping variables and QoL variables

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	**-0.377****	**-0.387****	-0.276*
	Timeline – acute/chronic	-0.085	-0.068	-0.032
	Timeline – cyclical	-0.303**	-0.262*	-0.223*
	Consequences	**-0.506****	**-0.526****	**-0.584****
	Personal control	**0.374****	**0.348****	0.277*
	Treatment control	0.251*	0.121	0.128
	Illness coherence	0.184	0.096	0.111
	Emotional representations	**-0.646****	**-0.581****	**-0.632****
	Psychological attributions	**-0.371****	-0.255*	-0.246*
	External factors	-0.060	-0.045	-0.010
	Behavioural risk factors	-0.163	-0.129	-0.108
	Heredity	-0.039	0.032	-0.025
	Poor medical care	-0.163	-0.145	-0.123
Coping variables	Distraction	-0.178	-0.169	-0.131
	Palliative	**-0.494****	**-0.575****	**-0.540****
	Instrumental	0.110	0.007	-0.021
	Emotional preoccupation	**-0.639****	**-0.566****	**-0.611****

In general terms, the findings above demonstrated a similar pattern to the restricted correlations (in terms of participants) carried out in the previous chapter looking at the associations between IP's, coping and QoL. The only difference is that in the analysis above behavioural risk factors are not significantly correlated with QoL. The majority of the significant correlations above are also slightly larger than those reported at this time point in the previous chapter.

Looking at the significant IP correlations in turn, for all the QoL variables QoL increased if fewer symptoms were reported, though social QoL is only a weak correlation and becomes non-significant once the Bonferroni correction is applied. The timeline-cyclical variable is significantly negatively correlated with all of the QoL variables, as in the previous chapter. However, these are relatively weak correlations which are all lost once the Bonferroni correction is applied.

The consequences and personal control variables are both significantly correlated with all QoL variables. The correlations are stronger for the consequences variable than the personal control variable; this is particularly noticeable for the social QoL variable, which is the strongest correlation for consequences while the personal control variable is only weak. This particular significant correlation is also lost once the Bonferroni correction is applied. These findings indicate that individuals whose cardiac problems have fewer consequences also have better QoL, as do those individuals who have a greater sense of personal control over their cardiac problems. Unlike the previous chapter findings there is one significant finding for the treatment control variable with emotional QoL, indicating that believing in the effectiveness of treatment leads to better emotional QoL. This again is only a weak association that is lost once the Bonferroni correction is applied.

The strongest correlations are between emotional representations and all the QoL domains. Individuals who reported more negative emotional effects due to their cardiac problems also reported lower QoL. Only one of the cause subscales of the IPQ-R is significantly correlated with the QoL variables, the psychological attributions variable, implying that individuals who attributed their cardiac problems to psychological factors such as stress also reported lower quality of life. These associations are only weak to moderate, and only the emotional and overall significant associations remain once the Bonferroni correction is applied. The two coping subscales which are significantly correlated with QoL are palliative and emotional preoccupation, as in the previous chapter. These are both reasonably strongly negatively correlated with QoL.

In order to investigate which of the significantly correlated IP and coping variables are independent predictors of QoL, regressions were carried out. However, as the analysis in this chapter is cross-sectional rather than longitudinal initial quality of life was not entered into the regression analysis as a first block in any of the analyses in this chapter. Therefore, the first block for each regression analysis consisted of all the significant IP variables and a second block added the significant coping variables. The first QoL variable examined was the emotion QoL variable. This resulted in a 5 step model. The first step entered IP emotional representations (adjusted R square = 0.425, F(1, 81)=61.608, p<0.001); the second step added IP consequences (R square change = 0.070, F(2,80)= 40.292, p<0.001); the third added IP psychological attributions (R square change = 0.038, F(3,79)= 30.865, p<0.001); the fourth added IP personal control (R square change = 0.039, F(4,78)= 26.738, p<0.001); and the final step added the emotional preoccupation coping variable (R square change = 0.041). The final model accounted for almost 60% of the variance in the MacNew emotion variable (F(5,77)=25.050, p<0.001). All other significant IP and coping variables were excluded from the analysis. For the final model average VIF = 1.512, minimum tolerance was 0.495, and the Durbin-Watson statistic was 2.407. Final beta values and significance values are given in table 11.2.

Table 11.2 Final beta and significance results for the pre-surgery MacNew emotion regression analysis

Stage One IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.234	0.022
IP consequences	-0.277	0.001
IP psychological attribution	-0.188	0.014
IP personal control	0.167	0.036
Emotional preoccupation	-0.278	0.005

The same procedure was followed for the pre-surgery MacNew physical variable. This generated a 5 step model. The first step entered IP emotional representations as in the previous analysis (adjusted R square =0.325, F(1,82)= 40.989, p,0.001); the second step added IP consequences (R square change = 0.098, F(2,81)= 30.656, p<0.001); the third added IP personal control (R square change = 0.052, F(3,80)= 24.908, p<0.001); the fourth added IP identity (R square change = 0.030, F(4,79)= 20.823, p<0.001); and the final step added palliative coping (R square change = 0.060). The final model accounted for nearly 55% of the variance in the MacNew physical variable (F(5,78)= 20.963, p,0.001). In this model average VIF was 1.329, minimum tolerance 0.635, and the Durbin-Watson statistic 1.926. Final beta and significance values are given in table 11.3.

Table 11.3 Final beta and significance results for the pre-surgery MacNew physical regression analysis

Stage One IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.211	0.026
IP consequences	-0.298	0.001
IP personal control	0.170	0.044
IP identity	-0.145	0.065
Palliative coping	-0.294	0.001

The same procedure was repeated for the MacNew social variable. This produced a 4 step model. The first variable entered into the regression was IP emotional representations (adjusted R square = 0.399, F(1,82)= 56.213, p<0.001); the second step added IP consequences (R square change = 0.120, F(2,81)= 45.132, p<0.001); the third added palliative coping (R square change = 0.057, F(3,80)= 37.477, p<0.001); and the final step added emotional preoccupation (R square change = 0.027, F(4,79)= 31.066, p<0.001). The final model accounted for nearly 60% of the variance in the social MacNew variable. Average VIF in this case was 1.681, minimum tolerance 0.495, and the Durbin-Watson statistic 1.953. Final beta and significance values are given in table 11.4.

Table 11.4 Final beta and significance results for the pre-surgery MacNew social regression analysis

Stage One IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.250	0.012
IP consequences	-0.321	P<0.001
Palliative coping	-0.207	0.018
Emotional preoccupation	-0.234	0.021

11.3 An examination of possible associations between post-surgery IP, coping and QoL variables

The correlations for this analysis are given in table 11.5.

Table 11.5 Spearman's correlations between post-surgery IP's, coping variables and QoL variables

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	**-0.338****	**-0.404****	**-0.385****
	Timeline – acute/chronic	-0.205	-0.168	-0.154
	Timeline – cyclical	**-0.487****	**-0.407****	**-0.398****
	Consequences	**-0.371****	**-0.363****	**-0.403****
	Personal control	0.189	0.167	0.122
	Treatment control	0.233*	0.165	0.158
	Illness coherence	**0.506****	**0.371****	**0.376****
	Emotional representations	**-0.596****	**-0.455****	**-0.471****
	Psychological attributions	-0.293*	-0.183*	-0.146
	External factors	-0.052	-0.007	0.035
	Behavioural risk factors	-0.118	-0.153	-0.119
	Heredity	0.043	-0.113	-0.099
	Poor medical care	-0.234*	-0.214	-0.232*
Coping variables	Distraction	-0.236*	-0.354**	-0.319**
	Palliative	**-0.450****	**-0.506****	**-0.473****
	Instrumental	-0.007	-0.211	-0.208
	Emotional preoccupation	**-0.612****	**-0.529****	**-0.553****

Interestingly, at this time point once the Bonferroni correction was applied the significant associations were identical to those which were significant at pre-surgery for all domains of the MacNew QoL measure. Looking at the significant correlations in turn; as at the previous time point the greater the number of symptoms reported (as measured by the identity variable) the poorer reported QoL, these correlations are of a moderate size in general. Time-cyclical is also significantly negatively correlated with all QoL domains, with slightly stronger correlations than for identity. Treatment control has a significant association with QoL, but only for the emotional domain, indicating that a greater belief in the effectiveness of treatment was associated with improved emotional QoL. However, this is not significant once the

Bonferroni correction is applied. Illness coherence is significantly positively associated with all domains of QoL, though the strength of this association varies across the domains. Emotional representations are, as at the previous time point, also moderately to strongly negatively correlated with all QoL domains. Two of the cause subscales were weakly negatively correlated with the emotion domain of QoL, indicating that a belief that cardiac problems were caused by psychological factors such as stress, or by poor medical care in the past is associated with poorer emotional QoL. The findings for the other two domains were not significant, and once the Bonferroni correction was applied none of the cause variables were significantly correlated with QoL.

Of the coping variables all but the instrumental variable were significantly negatively correlated with QoL. The strength of these correlations varied, with those for distraction being weak (these associations were not significant once the Bonferroni correction was applied), those for palliative coping being moderate to strong, and those for emotional preoccupation being the strongest. As in the previous section, in order to investigate which of the significantly correlated IP and coping variables are independent predictors of QoL stepwise regressions were carried out. The first QoL variable examined was the emotion QoL variable. This generated a 3 step model. As in the previous section the first variable entered was IP emotional representations (adjusted R square = 0.428, F(1,76)= 58.656, p<0.001); the second step added IP illness coherence (R square change = 0.047, F(2,75)= 34.999, p<0.001); and the final step added palliative coping (R square change = 0.149, F(3,74)= 42.319, p<0.001). The final model accounted for nearly 62% of the variance in the MacNew emotion variable. In this case the final model had average VIF of 1.254, average tolerance of 0.728, and Durbin-Watson statistic of 2.803. The final beta and significance values are given in table 11.6.

Table 11.6 Final beta and significance results for the post-surgery MacNew emotion regression analysis

Stage Two IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.479	p<0.001
IP illness coherence	0.318	p<0.001
Palliative coping	-0.391	p<0.001

This procedure was then repeated for the MacNew physical variable. This again generated a 3 step model. The first variable entered was IP emotional representations (adjusted R square = 0.235, F(1,76)= 24.671, p<0.001); the second step added IP identity (R square change = 0.040, F(2,75)= 14.964, p<0.001); and the final step added palliative coping (R square change = 0.198, F(3,74)= 23.087, p<0.001). The final model accounted for just over 46% of the variance in the MacNew physical variable. For this model, the average VIF was 1.075, minimum tolerance 0.899, and the Durbin-Watson statistic = 1.994. The final beta and significance values are given in table 11.7.

Table 11.7 Final beta and significance results for the post-surgery MacNew physical regression analysis

Stage Two IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.448	p<0.001
IP identity	-0.101	0.254
Palliative coping	-0.457	p<0.001

This procedure was then repeated for the MacNew social variable. This resulted in a 3 step model, and, as in the other regression analyses reported so far, the first variable entered was IP emotional representations (adjusted R square = 0.263, F(1,76)= 28.469, p<0.001); the second step added IP time cyclical (R square change = 0.041,F(2,75)= 17.153, p<0.001); and the final step added palliative coping (R square change = 0.175, F(3,74)= 23.569, p<0.001). The final model accounted for almost 47% of the variance in the MacNew social variable. In this case average VIF was 1.255, minimum tolerance was 0.721, and Durbin-Watson was 1.938. The final beta and significance values are given in table 11.8.

Table 11.8 Final beta and significance results for the post-surgery MacNew social regression analysis

Stage Two IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.443	p<0.001
IP time cyclical	-0.118	0.232
Palliative coping	-0.430	p<0.001

11.4 An examination of possible associations between post-cardiac rehabilitation IP, coping and QoL variables

The post-cardiac rehabilitation correlations are given in table 11.9.

Table 11.9 Spearman's correlations between post-cardiac rehabilitation IP's, coping variables and QoL variables.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	-0.213	-0.278*	-0.308**
	Timeline – acute/chronic	0.015	-0.043	0.041
	Timeline – cyclical	**-0.543****	**-0.505****	**-0.462****
	Consequences	-0.322**	-0.321**	-0.324**
	Personal control	0.299*	**0.367****	0.281*
	Treatment control	0.334**	0.325**	0.266*
	Illness coherence	0.337**	0.329**	0.311**
	Emotional representations	**-0.551****	**-0.439****	**-0.429****
	Psychological attributions	**-0.379****	-0.177	-0.180
	External factors	-0.159	-0.263*	-0.217
	Behavioural risk factors	-0.059	-0.091	-0.032
	Heredity	**0.356****	0.225	0.244*
	Poor medical care	-0.137	0.013	-0.047
Coping variables	Distraction	0.069	-0.079	-0.050
	Palliative	-0.288*	**-0.366****	**-0.313****
	Instrumental	0.200	0.134	0.137
	Emotional preoccupation	**-0.509****	**-0.535****	**-0.511****

At this time point eight IP variables and 2 coping variables were significantly correlated with at least one QoL domain. Looking at the significant IP variables in turn, the number of symptoms reported is significantly negatively correlated with all but the emotional QoL domain, indicating that reporting more symptoms is associated with poorer physical and social QoL. These correlations are weak however, and non-significant once the Bonferroni correction is applied. Timeline cyclical is also negatively correlated with QoL; these correlations are stronger and still significant after the Bonferroni correction. While the consequences variable is also significantly negatively correlated with QoL, these correlations are again fairly weak and are non-significant once the Bonferroni correction is made.

Personal control is positively significantly correlated with QoL, however, these correlations are all fairly weak, with only the significant association with the physical domain remaining once the Bonferroni correction is applied. Having a belief that the treatment is effective is also significantly associated with QoL, but again these correlations are weak and do not remain once the Bonferroni correction is applied. Understanding cardiac problems is also associated with significantly better QoL, but this association becomes non-significant once the Bonferroni correction is applied. Emotional representations, as at the previous time points, is negatively correlated with all the QoL domains.

At this time point three of the cause variables are significantly associated with some aspect of QoL. A stronger belief in psychological causes of cardiac problems is significantly associated with poorer emotional QoL. A stronger belief in external factors causing the illness is significantly associated with poorer physical QoL. Finally, a belief that heredity is a major cause of the cardiac problems is associated with significantly better QoL across all but the physical QoL domain. These correlations are all fairly weak, however, so once the Bonferroni correction is applied significant associations are only found for the emotional QoL variable and the psychological attributions and heredity cause variables.

Both palliative coping and emotional preoccupation were significantly negatively correlated with all the QoL domains. These associations were fairly weak for palliative coping but strong for emotional preoccupation. Once the Bonferroni correction is applied the palliative coping variable is no longer significantly correlated with the emotion QoL domain, all the other significant correlations remained. As in the previous two sections, a number of stepwise regressions were carried out. First, the MacNew emotion variable was examined. The model generated had 4 steps. The first step input IP emotional representations (adjusted R square = 0.261, F(1,70)=26.133, p<0.001); the second step added IP causes heredity (R square change= 0.093, F(2,69)=19.852, p<0.001); the third added IP time cyclical (R square change= 0.041, F(3,68)= 15.488, p<0.001); and the final step added the coping variable emotional preoccupation (R square change= 0.058, F(4,67)=14.521, p<0.001). The final model accounted for 43% of the variance of the MacNew emotion variable. For the final model the average VIF was 1.601, minimum tolerance 0.465, and the Durbin-Watson statistic was 2.366. The final beta and significance values are given in table 11.10.

Table 11.10 Final beta and significance results for the post-rehab MacNew emotion regression analysis

Stage Three IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.181	0.173
IP causes heredity	0.302	0.001
IP time cyclical	-0.235	0.043
Emotional preoccupation	-0.308	0.009

This procedure was repeated for the MacNew physical variable. This generated a 2 step model. The first variable entered was IP time cyclical (adjusted R square= 0.265, F(1,70)= 26.664, p<0.001); the other step added the coping variable emotional preoccupation (R square change= 0.103, F(2,69)=21.055, p<0.001). The final model accounted for 36% of the variance in the MacNew physical variable. The collinearity statistics for this final model were average VIF=1.212, minimum tolerance 0.825, and Durbin-Watson=1.780. The final beta values were B=-0.377, p=0.001 for time cyclical and Beta=-0.354, p=0.001 for emotional preoccupation.

The same procedure was then repeated for the MacNew social variable. Again this generated a 2 step model, with the same pattern of variables. The first variable entered was IP time cyclical (adjusted R square= 0.212, F(1,71)= 20.344, p<0.001); and the second and final step added the coping variable emotional preoccupation (R square change= 0.120, F(2,70)=18.246, p<0.001). This final model accounted for 32% of the variance in the MacNew social variable. In this case the average VIF was 1.217, minimum tolerance 0.822, and the Durbin-Watson statistic was 2.100. The final beta values were B=-0.311, p=0.005 for time cyclical and Beta=-0.382, p=0.001 for emotional preoccupation.

11.5 An examination of possible associations between one-year follow-up IP, coping and QoL variables

The one-year follow-up correlations are given in table 11.11.

Table 11.11 Spearman's correlations between one-year follow-up IP's, coping variables and QoL variables.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity	**-0.386****	**-0.408****	**-0.405****
	Timeline – acute/chronic	-0.046	-0.142	-0.072
	Timeline – cyclical	**-0.536****	**-0.561****	**-0.501****
	Consequences	-0.314**	-0.355**	**-0.374****
	Personal control	0.159	0.241*	0.229
	Treatment control	0.235	0.316**	0.287*
	Illness coherence	**0.460****	**0.470****	**0.412****
	Emotional representations	**-0.560****	**-0.537****	**-0.562****
	Psychological attributions	**-0.423****	**-0.363****	**-0.428****
	External factors	-0.147	-0.227	-0.148
	Behavioural risk factors	-0.041	-0.048	-0.044
	Heredity	0.316**	0.304*	0.308*
	Poor medical care	-0.243*	-0.180	-0.246*
Coping variables	Distraction	-0.099	-0.096	-0.086
	Palliative	**-0.513****	**-0.440****	**-0.474****
	Instrumental	**0.305***	0.264*	0.266*
	Emotional preoccupation	**-0.688****	**-0.661****	**-0.721****

At the final time point the number of significant correlations was greater than at any of the earlier assessment stages. As at all previous time points the number of symptoms reported is significantly negatively correlated with QoL. A belief in their cardiac problems being episodic is also significantly associated with a poorer QoL. These correlations are moderate to strong. Weaker significant negative correlations are found between the consequences IP variable and QoL. Once the Bonferroni correction is applied, however, the correlation between consequences and QoL only remained significant with the social QoL domain.

There is a significant positive association between personal control and physical QoL, and significant positive associations with all but the emotional QoL domain for treatment control. These correlations are all weak though, and are not significant once the Bonferroni correction is applied. The remaining two main IP variables are significantly correlated across all QoL domains, indicating that having a greater understanding of their cardiac problems and reporting less negative emotional representations of their illness was associated with better QoL. All these correlations are moderate in size.

Three of the cause variables are significantly associated with at least some of the QoL domains. Having a belief that cardiac problems are caused by psychological factors such as stress is significantly negatively associated with all domains of QoL, while a belief in hereditary causes is associated with better QoL. Belief that poor medical care in the past is a causative factor is significantly associated with poorer emotional and social QoL. These later two sets of correlations are fairly weak, however, and no longer apply once the Bonferroni correction is applied.

As at the previous time point using palliative and emotional preoccupation as coping strategies is significantly negatively correlated with poorer QoL. These are all strong correlations. Interestingly, exclusively at this time point there are significant positive associations across all QoL domains for instrumental coping. These correlations are fairly weak, however, and the only significant correlation once the Bonferroni correction is applied is between instrumental coping and the emotion domain. The next set of regressions investigated associations at one-year follow-up. Due to the large number of significant correlations at this time point the number of variables entered into the analysis exceeded usual recommended limits, which may have implications for the findings of these regression analyses.

First, the MacNew emotion variable was examined. This generated a 4 step model. The first variable entered was IP emotional representations (adjusted R square=0.402, F(1,66)=45.955, p<0.001); the second step added IP illness coherence (R square change=0.059, F(2,65)= 28.725, p<0.001); the third added the coping variable emotional preoccupation (R square change=0.111, F(3,64)=29.454, p<0.001); and the final step added instrumental coping (R square change=0.070, F(4,63)=29.250, p<0.001). The final model accounted for 65% of the variance in the MacNew emotion variable. The collinearity statistics in this final model were average VIF=1.441, minimum tolerance was 0.561, and Durbin-Watson 1.880. The final beta and significance values are given in table 11.12.

Table 11.12 Final beta and significance results for the one-year follow-up MacNew emotion regression analysis

Stage Four IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.258	0.009
IP illness coherence	0.108	0.192
Emotional preoccupation	-0.526	p<0.000
Instrumental coping	0.281	0.001

This procedure was then repeated for the MacNew physical variable. This generated a 4 step model with the first variable entered being IP emotional representations (adjusted R square=0.333, F(1,66)=34.384, p,0.001); the second step added IP illness coherence (R square change=0.101, F(2,65)=25.882, p<0.001); the third added IP identity (R square change=0.041, F(3,64)=20.058, p<0.0001); and the final step added the coping variable emotional preoccupation (R square change=0.073, F(4,63)=19.828, p<0.001). The final model accounted for almost 56% of the variance in the McNew physical variable. For the final model average VIF was 1.389, minimum tolerance 0.609, and the Durbin-Watson statistic 2.261. The final beta and significance variables are given in table 11.13.

Table 11.13 Final beta and significance results for the one-year follow-up MacNew physical regression analysis

Stage Four IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.250	0.022
IP illness coherence	0.239	0.011
IP identity	-0.203	0.025
Emotional preoccupation	-0.346	0.002

This procedure was then repeated for the MacNew social variable. This generated a 3 step model. The first variable entered was again IP emotional representations (adjusted R square= 0.411, F(1,66)=47.777, p<0.001); the second step added IP illness coherence (R square change=0.046, F(2,65)=28.317, p<0.001); and the final step added the coping variable emotional preoccupation (R square change= 0.128, F(3,64)=31.122, p<0.001). The final model accounted for 58% of the variance in the social MacNew variable. For the final model the collinearity statistics were average

VIF 1.451, minimum tolerance 0.610, and Durbin-Watson 2.227. The final beta and significance values are given in table 11.14.

Table 11.14 Final beta and significance results for the one-year follow-up MacNew social regression analysis

Stage Four IP and coping variable added	*Beta*	*Significance*
IP emotional representations	-0.343	0.001
IP illness coherence	0.123	0.157
Emotional preoccupation	-0.458	p<0.001

The implications of the findings of this chapter will now be discussed.

11.6 Summary and preliminary discussion of findings

In order to simplify the discussion of the findings of this chapter a summary table indicating which IP and coping variables figure in the regression analyses at each time point for the QoL variables is given overleaf. The four time points are indicated numerically, with baseline/pre-surgery=1; post-surgery=2, post-rehab=3, and one-year follow-up=4. The use of bold type indicates the first variable to be entered into the regression model at each time point, this variable also has the greatest adjusted R square value. This is illustrated in table 11.15.

Table 11.15 Overall summary of predictive relationships between IP's, coping variables and QoL variables at all time points.

		MacNew emotional	*MacNew physical*	*Macnew social*
IP variables	Identity		1, 2, 4	
	Timeline – acute/chronic			
	Timeline – cyclical	3	**3**	2, **3**
	Consequences	1	1	1
	Personal control	1	1	
	Treatment control			
	Illness coherence	2, 4	4	4
	Emotional representations	**1**, **2**, **3**, **4**	**1**, **2**, **4**	**1**, **2**, **4**
	Psychological attributions	1		
	External factors			
	Behavioural risk factors			
	Heredity	3		
	Poor medical care			
Coping variables	Distraction			
	Palliative	2	1, 2	1, 2
	Instrumental	4		
	Emotional preoccupation	1, 3, 4	3, 4	1, 3, 4

As can be seen in the above table there are a number of possible patterns developing in terms of applying the CSM to this patient population. Interestingly, associations between cognitive representation variables and QoL show some differences across the time points. Identity – the number of symptoms attributed to the individual's cardiac illness – is related to physical QoL at three of the four time points. The belief that cardiac problems are episodic is associated with poorer QoL at all but the pre-surgery time point. The lack of an association at pre-surgery may be due to the episodic nature of the cardiac problem being expected prior to surgery but not post-surgery. This is reinforced by the fact that, in terms of regression analysis, this variable has a predictive ability across all QoL domains at the third time point (post-cardiac rehabilitation), and on two of the QoL domains immediately following surgery. However, it should also be mentioned that the previous chapter reported that the baseline timeline-cyclical also predicted QoL post-cardiac rehabilitation.

Consequences and personal control beliefs seem to be related to quality of life only at the baseline stage. As discussed in the previous chapter this appears to be inconsistent with the findings of Petrie and colleagues (1996), who found that consequence beliefs were a predictor of factors such as return to work and psychological functioning post-rehabilitation in a mixed MI and cardiac surgery group; and hence an important component of the CSM in a related cardiac population. In contrast illness coherence is a predictor of QoL primarily at final follow-up. This may be due to the fact that undergoing surgery, with the associated information given by the cardiologists and surgeons prior to this, and by the nursing staff and rehabilitation teams post-surgery, may lead to a greater sense of understanding being developed over the course of the study. This may then lead to the significant positive association between illness coherence and QoL at all time point's post-surgery, with this having a predictive effect at the final time point. However, the data in chapter 9 which looked at changes in IP variables over time shows that scores on this variable remained fairly constant across the time span of the study; and for all but physical QoL these findings are non-significant within the final regression model.

The IP variable that seems the most consistent predictor of QoL is emotional representations. It is significantly negatively correlated with all domains of QoL at all time points, and is one of the variables in all but two of the regression models generated. Interestingly, it is also the first variable entered into all but one of the regression models, and hence explains the greatest proportion of variance in emotional QoL at all time points, and in all other QoL domains at all but the post-cardiac rehabilitation time point. It should be noted that at this post-rehabilitation point emotional representations become non-significant within the final model. The cause variables appear to have little effect on QoL, and any effect is primary associated with emotional QoL. The cause variable that is most frequently associated with QoL is psychological attributions which is made up of items such as stress and personality. The general lack of association between causes and QoL may be due to the fact that this particular patient population had been living with their cardiac problems for some time, and therefore the cause of their illness had become less important to them.

Distraction is not associated with either improved or poorer QoL at any time point. In general, the use of palliative coping strategies at earlier time points is indicative of poorer QoL, while the use of emotional preoccupation is associated with poorer QoL at the later time points. There are some positive associations between instrumental coping and QoL, but only at the final time point and this is purely associated with emotional QoL. This may indicate some patients are looking for advice or practical help beyond that gained by undergoing cardiac surgery and attending cardiac rehabilitation in order to boost their QoL long term.

These findings again provide only partial support for the two hypotheses introduced at the beginning of this chapter. However, the pattern of findings is somewhat different at each time point. Looking at the first hypothesis that poor personal control beliefs, more severe consequences, poor illness coherence and more negative emotional representations are predictive of poor QoL, it can be seen that this is better supported pre-surgery, with consequences and emotional representations predicting all aspects of QoL and personal control all but social QOL, though illness coherence is still not predictive. At post-surgery there is much less support, with emotional representations still predicting all aspects of QoL but personal control and consequences not; however illness coherence does predict emotional QoL here. Post-rehabilitation the hypothesis can be rejected as the only predictor of QoL is emotional representations, and this only predicts emotional QoL, but within the final regression model at this time point emotional representations become non-significant. At the final time point interestingly the only cognitive representation to play a role is illness coherence which predicts all aspects of QoL, as does emotional representations. Taken together the findings from these analyses provide support for the idea that associations between IPs and other variables may vary depending on when the measures are taken. The different findings with respect to pre-surgery associations in this chapter in comparison to the previous chapter indicates that the small numbers in chapter 10 may have influenced the correlations, indicating a possible need for caution in interpreting those results. The strength of these emotion driven predictors of QoL may partly explain the differences with other research which has found more severe consequences (French et al., 2005; Aalto et al., 2006; Stafford, Berk & Jackson, 2009), more symptoms (Stafford et al, 2009), and poor control (Aalto et al., 2006; Stafford et al., 2009) to be predictive of poorer QoL.

Turning to the second hypothesis, palliative coping predicts outcome both pre-surgery and post-surgery, while emotional preoccupation predicted poorer emotional and social QoL pre-surgery, post-rehabilitation and at one-year follow-up, and additionally physical QoL at these latter 2 points. Instrumental coping predicted better emotional QoL at the final time point also.

Overall, this chapter supports the dynamic nature of the CSM. Rutter and Rutter (2007) stated that personal models of illness are affected by treatment interventions and changes in clinical state, both of which would apply to this population group. However, the commonalities observed in table 11.19 do seem to indicate that the cognitive aspects of the CSM appear to play a lesser role than emotional representations and choice of coping strategy. This is particularly interesting as the bulk of research that has been carried out into the CSM has concentrated on the cognitive representations people develop (Hagger & Orbell, 2003). Another area that has been examined before is the role of IPs on attendance at, completion of, and outcome after cardiac rehabilitation (Cooper et al., 1999; Michie et al., 2005; Petrie et al., 2002; Petrie & Weinman, 1997; Petrie et al., 1996; Whitmarsh et al., 2003). This research found that cognitive representations including consequences and control beliefs were important predictors of such behaviour; therefore it will be interesting to see if this is also the case for this patient group.

Chapter 12: Associations between illness perceptions and coping, cardiac rehabilitation attendance and lifestyle changes

12.1 Introduction

This chapter examines associations between and the possible influence of IPs and coping on attendance at cardiac rehabilitation and changes in lifestyle indicators. The latter focus on dietary changes across three time-points: post-surgery but pre-rehabilitation (stage two); post-rehabilitation (stage three); and one-year follow-up (stage four), and attendance at cardiac rehabilitation.

Cardiac rehabilitation has long been seen as an important part of the recovery process after cardiac surgery (McKee, 2009), as well as having an important role to play in improving both patients' quality of life and physical functioning (Lindsay, Hanlon, Smith & Belcher, 2003; McKee, 2009). There has been considerable research into factors that might affect attendance, including demographic factors, such as socioeconomic group, age and gender; health related factors such as obesity and diabetes; practical barriers, such as transport problems or caring responsibilities; and psychological factors, such as available social support and IPs (Hird, Upton, & Chesson, 2004; Farley, Wade, & Birchmore, 2003; Lindsay et al., 2003; Wyer, Joseph, & Earll, 2001). In particular, attendance at cardiac rehabilitation has been found to be predicted by the extent to which a person believes that their cardiac problems are curable or controllable (Petrie et al. 1996), and greater perceived consequences (Whitmarsh et al., 2003). Perceived control has also been reported to be improved after attendance at rehabilitation (Michie et al, 2005). Approach focussed coping, in particular information seeking, has also been associated with better attendance at rehabilitation (Wyer, Earll, Joseph & Harrison, 2001). The associated hypothesis for this thesis is that attendance at rehabilitation is associated with greater beliefs in personal and treatment control, more severe consequences, and an attribution to previous behavioural risk factors.

The effects of lifestyle change interventions that are part of cardiac rehabilitation programmes are also known to improve outcome, with dietary improvements leading to a reduction in arterial stenosis at both 1 year and 5 year follow-up, and a reduction in psychological distress at 1 year follow-up in patients who had undergone rehabilitation after PTCA (Pischke, Scherwitz, Weidner, & Ornish, 2008). It is known that lifestyle factors such as poor diet and smoking are common causal attributions in patients who have suffered an MI (Weinman, Petrie, Sharpe, & Walker, 2000). The patients who endorsed such causal attributions were also more likely to have changed dietary and smoking behaviours when assessed six months after their MI. Indeed, such changes in health behaviour are some of the main goals of cardiac rehabilitation (Savage, Lee, Harvey-Berino, Brochu, & Ades, 2002; Timlin, Shores, & Reicks, 2002). This indicates that factors that may be associated with changes in these lifestyle factors are an important area of research. However, there is limited research into the areas of diet and smoking or into the role that coping strategies may play in this relationship. The hypothesis linked to this part of the thesis is that those making positive lifestyle changes will demonstrate a greater belief in treatment control, have perceived more severe consequences prior to rehabilitation, attribute their cardiac problems to their own behaviour and demonstrate more positive emotional representations.

This chapter, therefore, assesses whether IPs and coping influence attendance at rehabilitation, and investigates whether they have a role in lifestyle changes made by the individual. This will primarily be explored from pre- to post-rehabilitation, as this is predominantly where such behavioural change advice is focussed, but also at one-year follow-up to see if there are factors that predict long-term adherence to lifestyle change advice. As with previous chapters, data was only included in the analysis if the patients had initial or pre-rehabilitation IP and coping data, as well as the relevant lifestyle data at all three time-points being examined in this chapter. There were different participants for each individual lifestyle variable, however, as not all participants ate the same type of food. For example, if someone did not eat cheese at any of the three stages then their data was not included in analysis to assess the effect of IPs and coping variables on changes in the type of cheese consumed. How all the variables were measured is detailed in section 12.2.

12.2 The measurement of IPs, coping and lifestyle factors.

As in the previous chapters the IP variables were derived from the IPQ-R questionnaire (Moss-Morris et al., 2002), and the coping variables from the four subscales of the CHIP (Endler, Parker, & Summerfeldt, 1998). The lifestyle variables were smoking, alcohol use and diet. For the *smoking* variable participants were asked to classify themselves as *current, ex- or never smokers*. These categories were those used by the Cardiothoracic Centre during the patients' pre-surgical assessments. *Alcohol* use was measured by a single question asking for units consumed in a week (*none, 1-5 units/week, 6-10 units/week, 11-15 units/week, 16-20 units/week, >20 units/week*). The dietary questions queried the types of *spread, fat, bread, cereal, milk* and *cheese* used by the participants, and the amount of *sugar* they take per day. These categories were suggested by a research dietician at Manchester University. As well as describing the type of product they used, participants were also asked for the brand name of products as a check that their interpretation of the type of product was correct. The participants' responses were then coded, after consultation with a dietician working at the Cardiothoracic Centre with cardiac patients, according to the relative benefits (or not) in choosing a particular type of product. For example, porridge was judged to be a very healthy choice for those with cardiac problems, while muesli was less of an optimal choice of cereal due to its high sugar content. This led to the following classifications: *spread – none, healthiest option, mid-range option, unhealthy option; fat - none, healthiest option, mid-range option, unhealthy option; bread - none, healthiest option, mid-range option, unhealthy option; cereal - none, healthiest option, upper mid-range option, lower mid-range option, unhealthy option; cheese - none, healthiest option, mid-range option, unhealthy option.* The *sugar* and *milk* variables were coded, as the *alcohol* variable was, according to the actual responses on the questionnaire (*sugar – none, 1 teaspoon all day, 2-4 teaspoons all day, 5-7 teaspoons all day, 8-10 teaspoons all day, >10 teaspoons all day; milk – none, skimmed milk, semi-skimmed milk, full fat milk*). In all cases none signified that they did not use that type of food at that time point. Where participants picked more than one option the unhealthiest option was the one that went forward, unless they clarified that they used that type of food very infrequently (e.g. full fat cheese), and used a healthier option more often (e.g. cottage cheese). While the *smoking* variable was assessed at all four time-points, the *alcohol* and dietary questions were only asked at time-points two (post-surgery and pre-rehabilitation), three (post-rehabilitation), and four (one-year follow-up) due to constraints from the ethics committee, who wanted to reduce the volume of questions being asked overall.

All the lifestyle measures are reliant on the participants accurately reporting their behaviour. However, the fact that participants reported one of the variables (*smoking*) to the hospital pre-surgery allows for the two sets of data (study questionnaire versus hospital assessment) to be compared to examine concurrence between them. Eighty-six patients had data from both these measures pre-surgery, which allowed a weighted Kappa test to be carried out. This used data extracted from a matrix showing the relevant smoking categories (current, ex or never smoker) from both sources mapped against each other, and then weighted according to the frequency count for each combination of responses. This then allowed the level of agreement between the two sources to be tested. The results indicated that there was a substantial agreement between the two sources according to the criteria put forward by Landis and Koch (1977; K=0.654, p<0.001). . This provides some validation for the smoking self report data.

The data related to cardiac rehabilitation came from two sources. Initially, patient data was collected from the patients' medical records at the two referring hospitals (Countess of Chester and Wrexham Maelor). The data collected were: whether the patient was invited to attend rehabilitation after surgery, whether they attended an initial assessment, how many actual sessions of rehabilitation they attended, which educational sessions they attended (e.g. diet, stress management, risk factors, etc), and whether they intended continuing exercise in a structured post-rehabilitation programme (this last question was not included in the analysis for this project). However, due to changes in management at the Cardiac Rehabilitation Unit at the Countess of Chester and general issues relating to data management in the paper medical records held, there were many gaps in the data available (a total of 85 sets of complete data were accessed). Therefore, a one page questionnaire was sent out to all participants asking for this data (47 responses were received), as well as an open question asking participants what they thought of the rehabilitation programme they attended (if applicable). In order to maximise the data available for analysis, the similarity in the number of sessions reported as attended as reported in the medical records from the Wrexham and Chester hospitals was compared with that reported by the patients in response to the questionnaire. This was carried out by performing a weighted Kappa test on the 39 sets of participant data where both figures were available. As with the smoking analysis detailed earlier this allowed the level of agreement in terms of the number of sessions attended to be assessed. The findings this time (K=0.809, p<0.001) indicated that the level of agreement was on the border of a substantial or near perfect agreement level according to Landis and Koch (1977). Due to this significant similarity between these two sets of data, substitutions from the patient reported data were made for 6 patients whose medical rehabilitation data was missing or incomplete. This then led to the generation of two variables used in the analysis in this chapter – whether rehabilitation was attended at least once, and the percentage of rehabilitation sessions attended (the percentage value was used as the total number of sessions differed at the two hospitals). Frequency data for the demographic data for cardiac rehabilitation will now be reported.

Table 12.1 Frequency data for attendance at cardiac rehabilitation and associated cardiac history

	Overall (%)	Male (%)	Female (%)
Attended at least one rehabilitation session	Yes 64 (86.5) No 10 (13.5)	Yes 55 (88.7) No 7 (11.3)	Yes 9 (75) No 3 (25)
Had previous Myocardial Infarction	Yes 32 (38.1) No 52 (61.9)	Yes 28 (41.2) No 40 (58.8)	Yes 4 (25) No 12 (75)
Had previous cardiac surgery	Yes 8 (9.5) No 76 (90.5)	Yes 7 (10.3) No 61 (89.7)	Yes 1 (6.2) No 15 (93.8)
Previously attended rehabilitation	Yes 9 (10.7) No 16 (19) Unknown 59 (70.2)	Yes 7 (10.3) No 14 (20.6) Unknown 47 (69.1)	Yes 2 (12.5) No 2 (12.5) Unknown 12 (75)

As can be seen from the table above, the majority of patients were males, and attended at least one rehabilitation session. Most had not had prior surgery or an MI. The data for previous rehabilitation is less clear as this was not available as standard in the data from the Cardiothoracic Centre, so had to be gleaned from the notes held by the respective referring hospitals. All but one of the individuals who had undergone rehabilitation before their cardiac surgery had had an MI in the past, as it is in fact standard practice to be referred to rehabilitation after an MI more patients may have undergone at least part of a programme of rehabilitation in the past. The frequency of attendance (that is the % of sessions attended) is shown in figure 12.1.

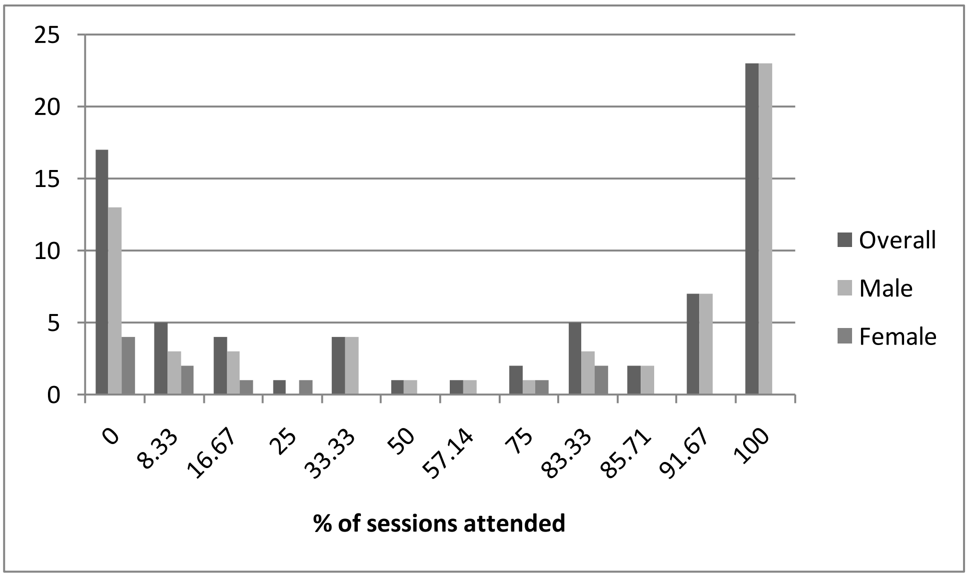

Figure 12.1 Frequency of attendance at cardiac rehabilitation

As can be seen from figure 12.1 the distribution of attendance levels was bimodal, with the majority of patients attending all sessions, followed by zero sessions. Looking at the genders separately it appears that males are more likely to attend all or nearly all of the sessions than females.

12.3 Differences in IP and coping scales between attenders and non-attenders at cardiac rehabilitation.

As noted above, previous research looked at differences in IPs between those who attended cardiac rehabilitation and those who did not (Petrie et al., 1996), finding differences in some variables. As this prior research concentrated on individuals who had just undergone a cardiac event such as an MI or, in fewer cases CABG, that is, data were collected at a point equivalent to stage two (post-surgery but before rehabilitation) in the current research. To enhance our understanding of the role of illness perceptions in attendance at cardiac rehabilitation, in the present analysis, both stage one (pre-surgery) and stage two IP and coping variables were compared for attenders versus non-attenders of at least one session of cardiac rehabilitation. Due to the non-normal nature of the attendance data, as demonstrated in figure 12.1, a series of Mann Whitney tests were used to perform this analysis. There were different numbers of responders at each time stage, leading to an n of 73 for the stage one analysis (63 attenders and 10 non-attenders), and an n of 58 (51 attenders and 7 non-attenders) for stage two. The findings for stage one are given in table 12.2.

Table 12.2 Differences in pre-surgery IP and coping scores between attenders and non-attenders of rehabilitation

	Attenders median (range)		Non-attenders median (range)		Mann Whitney U (p)
Timeline – acute/chronic	20.0	21	19.5	12	312.00 (0.96)
Timeline – cyclical	10.0	16	13.5	14	250.50 (0.29)
Consequences	22.0	18	20.5	15	276.50 (0.54)
Personal control	23.0	18	22.5	13	291.50 (0.70)
Treatment control	20.0	11	19.5	9	257.00 (0.35)
Illness coherence	20.0	14	20.0	14	294.00 (0.73)
Emotional representations	19.0	19	18.5	14	294.00 (0.74)
Identity	5.0	12	3.5	5	260.00 (0.37)
Psychological attributions	16.0	17	13.0	10	257.50 (0.35)
External factors	15.0	14	15.5	9	310.50 (0.94)
Behavioural risk factors	10.0	13	10.5	13	292.50 (0.72)
Palliative coping	25.0	27	24.0	26	276.00 (0.53)
Instrumental coping	32.0	20	30.5	18	233.00 (0.19)
Distraction	23.0	24	19.5	18	216.50 (0.11)
Emotional preoccupation	22.0	31	22.0	23	288.50 (0.67)

* = significant at 5% level and **= significant at 1% level

As can be seen from the above table there were no significant differences between attenders and non-attenders in stage one IP and coping variables. This analysis was repeated looking at the stage two IP and coping variables. The results of this analysis are given in table 12.3.

Table 12.3 Differences in pre-rehabilitation IP and coping scores between attenders and non-attenders of rehabilitation

	Attenders median (range)		Non-attenders median (range)		Mann Whitney U (p)
Timeline – acute/chronic	17.0	19	15.0	14	176.50 (0.96)
Timeline – cyclical	9.0	12	8.5	8	169.50 (0.83)
Consequences	20.0	22	18.5	15	166.00 (0.77)
Personal control	23.0	19	24.5	10	154.00 (0.55)
Treatment control	20.0	11	21.0	6	162.50 (0.70)
Illness coherence	20.0	14	20.5	7	159.50 (0.65)
Emotional representations	16.0	23	15.0	16	152.50 (0.53)
Identity	3.0	11	4.5	14	126.50 (0.21)
Psychological attributions	16.0	17	15.0	16	157.00 (0.61)
External factors	15.0	14	12.5	8	112.50 (0.11)
Behavioural risk factors	11.0	12	12.5	12	120.00 (0.16)
Palliative coping	24.0	26	22.0	17	128.00 (0.23)
Instrumental coping	31.0	40	26.0	16	114.00 (0.12)
Distraction	24.0	26	23.0	17	166.50 (0.77)
Emotional preoccupation	20.0	28	17.0	20	111.50 (0.11)

* = significant at 5% level and **= significant at 1% level

Again, there were no significant differences between the attenders and non-attenders on any of the IP and coping variables.

12.3.1 Discussion of differences in IP and coping variables between attenders and non-attenders

For both the initial (pre-surgery) and second stage IP and coping variables there were no significant differences between attenders and non-attenders at cardiac rehabilitation. There were very unequal numbers in the two groups, with the vast majority of participants being classified as attenders. The next analysis examined whether illness perception and coping scores were associated with frequency of attendance at cardiac rehabilitation.

12.4 The association between baseline and pre-rehabilitation IP and coping variables and the number of sessions of cardiac rehabilitation attended

This section will investigate whether there are any significant associations between the IP and coping variables at both stages one (pre-surgery) and two (pre-rehabilitation) and the percentage of sessions attended. Due to the known non-normality of data (see figure 12.1) Spearman's correlations were used for this analysis. For the stage one analysis the data from a total of 71 participants was used, and at stage two this number was 46. The results of the stage one analysis are given in table 12.4.

Table 12.4 Spearman's associations between pre-surgery IP and coping variables and % of rehabilitation sessions attended

	% of sessions attended r_s (p)
Timeline – acute/chronic	-0.097 (0.42)
Timeline – cyclical	-0.122 (0.31)
Consequences	-0.257 * (0.03)
Personal control	0.090 (0.45)
Treatment control	0.041 (0.73)
Illness coherence	0.205 (0.09)
Emotional representations	-0.083 (0.49)
Identity	0.091 (0.45)
Psychological attributions	0.078 (0.52)
External factors	0.132 (0.27)
Behavioural risk factors	-0.017 (0.89)
Palliative coping	-0.143 (0.24)
Instrumental coping	0.163 (0.18)
Distraction	0.083 (0.49)
Emotional preoccupation	-0.138 (0.25)

* indicates significant at 5% level, ** indicates significant at 1% level

As can be seen from table 12.4 there was only one significant (negative) correlation between percentage of sessions attended and the IP and coping variables (consequences). Those patients who reported that their cardiac problems had serious negative consequences on their lives before surgery were likely to attend fewer rehabilitation sessions than those patients who initially thought their cardiac problems had less effect on their day to day lives.

Table 12.5 Spearman's associations between pre-rehabilitation IP and coping variables and % of rehabilitation sessions attended

	% of sessions attended r_s (p)
Timeline – acute/chronic	-0.167 (0.27)
Timeline – cyclical	-0.188 (0.21)
Consequences	-0.175 (0.24)
Personal control	0.016 (0.92)
Treatment control	-0.035 (0.82)
Illness coherence	0.303 * (0.04)
Emotional representations	-0.205 (0.17)
Identity	-0.204 (0.17)
Psychological attributions	-0.163 (0.28)
External factors	-0.124 (0.41)
Behavioural risk factors	-0.058 (0.70)
Palliative coping	-0.103 (0.50)
Instrumental coping	0.047 (0.76)
Distraction	-0.093 (0.54)
Emotional preoccupation	0.105 (0.49)

* indicates significant at 5% level, ** indicates significant at 1% level

As can be seen from the above table there was only one significant finding, which is that illness coherence is significantly positively correlated with the number of rehabilitation sessions attended. Those with a better understanding of their cardiac problems post-surgery but before rehabilitation starts attended more rehabilitation sessions.

12.4.1 Summary and preliminary discussion of effects of IP and coping variables on percentage of rehabilitation attended.

For both sets of IP and coping variables a single IP variable was significantly correlated with the number of sessions attended, however the particular variable differed at each time stage. For the pre-surgery analysis there was a small but significant negative correlation with the consequences variable. While consequence beliefs were related to attendance at rehabilitation in the study by Whitmarsh and colleagues (2003), they found the opposite effect – those with greater consequences were more likely to attend rehabilitation. The slightly larger, significant, positive correlation between illness coherence and rehabilitation sessions attended at the post-surgery time point has not been found in previous research. In fact it is often assumed that knowledge and understanding, included to an extent the construct of illness coherence, would be improved by the educational aspects of cardiac rehabilitation, rather than being relatively well-developed beforehand. No associations were found for either of the control variables or timeline cyclical variables at either stage, unlike the research detailed earlier (Petrie et al., 1996).

The next issue to be examined will be the lifestyle factors that may have been targeted within the cardiac rehabilitation programmes (depending on which session's individuals attended). Initially, before any assessments are made of the influence of IPs and coping variables on lifestyle changes are made, it would be helpful to see if there are any changes in these behaviours over time. This will allow the data to be assessed to see if positive changes in behaviour are demonstrated after cardiac rehabilitation, and, if so, are they maintained over time.

12.5 Changes in lifestyle factors over time

Due to the ordinal nature of the data, a series of Friedman tests were used on the *smoking, alcohol* and dietary variables to examine any differences across the three time-points. Due to the fact that not all the patients actually eat all the food stuffs being assessed the number of participants alters for the different dietary variables (data has to be present at all three stages for the analysis to be carried out). Table 12.6 illustrates the change in frequency of the different categorical responses in the alcohol and dietary factors. Where significant differences according to the Friedman's test of at least $p<0.05$ (two-tailed) were present these are signified by the variable being highlighted in bold. For the purposes of the Friedman's analysis zero responses were discounted for all of the dietary variables except sugar, as in all other cases not eating or drinking such a product did not indicate a healthier dietary choice.

Table 12.6 Tables of frequencies (%) of smoking, alcohol and dietary variables at each time-point, indicating any significant differences

	Stage Two		*Stage Three*		*Stage Four*	
Smoking (n=54)	Current smoker	2 (3.7)	Current smoker	2 (3.7)	Current smoker	1 (1.9)
	Ex-smoker	33 (61.1)	Ex-smoker	32 (59.3)	Ex-smoker	34 (63)
	Never-smoked	19 (35.2)	Never-smoked	20 (37)	Never-smoked	19 (35.2)
Alcohol (n=53)	**None**	**18 (34)**	**None**	**16 (30.2)**	**None**	**12 (22.6)**
	1 – 5 units / week	**20 (37.7)**	**1 – 5 units / week**	**18 (34)**	**1 – 5 units / week**	**16 (30.2)**
	6 – 10 units/ week	**5 (9.4)**	**6 – 10 units/ week**	**7 (13.2)**	**6 – 10 units/ week**	**12 (22.6)**
	11 – 15 units / week	**2 (3.8)**	**11 – 15 units / week**	**4 (7.5)**	**11 – 15 units / week**	**5 (9.4)**
	16- 20 units / week	**6 (11.3)**	**16- 20 units / week**	**6 (11.3)**	**16- 20 units / week**	**7 (13.2)**
	> 20 units / week	**2 (3.8)**	**> 20 units / week**	**2 (3.8)**	**> 20 units / week**	**1 (1.9)**
Spread (n= 42)	**None**	**3 (7.1)**	**None**	**4 (9.5)**	**None**	**3 (7.1)**
	Healthiest option	**15 (35.7)**	**Healthiest option**	**13 (31)**	**Healthiest option**	**8 (19)**
	Mid-range option	**17 (40.5)**	**Mid-range option**	**20 (47.6)**	**Mid-range option**	**18 (42.9)**
	Unhealthy option	**7 (16.7)**	**Unhealthy option**	**5 (11.9)**	**Unhealthy option**	**13 (31)**
Fat (n=53)	None	2 (3.8)	None	1 (1.9)	None	1 (1.9)
	Healthiest option	21 (39.6)	Healthiest option	25 (47.2)	Healthiest option	23 (43.4)
	Mid-range option	30 (56.6)	Mid-range option	27 (50.9)	Mid-range option	29 (54.7)
	Unhealthy option	0 (0)	Unhealthy option	0 (0)	Unhealthy option	0 (0)
Bread (n=54)	None	0 (0)	None	0 (0)	None	1 (1.9)
	Healthiest option	7 (13)	Healthiest option	7 (13)	Healthiest option	7 (13)
	Mid-range option	25 (46.3)	Mid-range option	25 (46.3)	Mid-range option	26 (48.1)
	Unhealthy option	22 (40.7)	Unhealthy option	22 (40.7)	Unhealthy option	20 (37)

	Stage Two		*Stage Three*		*Stage Four*	
Cereal (n=44)	None	8 (17.8)	None	8 (17.8)	None	6 (13.3)
	Healthiest option	5 (11.1)	Healthiest option	11 (24.4)	Healthiest option	9 (20)
	Upper mid-range option	20 (44.4)	Upper mid-range option	16 (35.6)	Upper mid-range option	20 (44.4)
	Lower mid-range option	10 (22.2)	Lower mid-range option	8 (17.8)	Lower mid-range option	8 (17.8)
	Unhealthy option	2 (4.4)	Unhealthy option	2 (4.4)	Unhealthy option	1 (2.2)
Cheese (n=51)	None	8 (15.7)	None	10 (19.6)	None	9 (17.6)
	Healthiest option	3 (5.9)	Healthiest option	3 (5.9)	Healthiest option	2 (3.9)
	Mid-range option	16 (31.4)	Mid-range option	19 (37.3)	Mid-range option	15 (29.4)
	Unhealthy option	24 (47.1)	Unhealthy option	19 (37.3)	Unhealthy option	25 (49)
Sugar (n=56)	None	39 (69.6)	None	39 (69.6)	None	40 (71.4)
	1 teaspoon all day	6 (10.7)	1 teaspoon all day	6 (10.7)	1 teaspoon all day	3 (5.4)
	2 – 4 teaspoons all day	4 (7.1)	2 – 4 teaspoons all day	6 (10.7)	2 – 4 teaspoons all day	8 (14.3)
	5 – 7 teaspoons all day	5 (8.9)	5 – 7 teaspoons all day	3 (5.4)	5 – 7 teaspoons all day	4 (7.1)
	8 – 10 teaspoons all day	1 (1.8)	8 – 10 teaspoons all day	2 (3.6)	8 – 10 teaspoons all day	1 (1.8)
	> 10 teaspoons all day	1 (1.8)	> 10 teaspoons all day	0 (0)	> 10 teaspoons all day	0 (0)
Milk (n=56)	None	0 (0)	None	2 (3.6)	None	0 (0)
	Skimmed milk	12 (21.4)	Skimmed milk	13 (23.2)	Skimmed milk	12 (21.4)
	Semi-skimmed milk	42 (75)	Semi-skimmed milk	39 (69.6)	Semi-skimmed milk	40 (71.4)
	Full fat milk	2 (3.6)	Full fat milk	2 (3.6)	Full fat milk	4 (7.1)

It can be seen from the table 12.6 that there were significant differences between the three time-points for only two of the alcohol and diet variables – alcohol consumption and choice of spread (alcohol λ^2 (2) = 7.55, p=0.02; spread λ^2 (2) = 8.87, p=0.01). None of the other variables showed significant differences across time (smoking λ^2 (2) = 1, p=0.61; cereal λ^2 (2) = 3.05, p=0.22; cheese λ^2 (2) = 2.4, p=0.30; sugar λ^2 (2) = 0.12, p=0.94; milk λ^2 (2) = 2.33, p=0.31). For the alcohol and spread variables Wilcoxon tests were used to identify where the significant changes occurred. For alcohol there was no significant change in consumption from pre-rehab to post rehab (z = -1.15, p=0.25); however there were significant changes from both post-rehab to one-year follow-up (z=-2.00, p=0.05) and from pre-rehab to one-year follow-up (z=-2.29, p=0.02). Looking back to table 12.6 it can be seen that these significant changes are both in the unhealthy direction, that is, alcohol consumption levels increased. For type of spread a similar pattern emerged, with no significant difference from pre-rehab to post-rehab (z=-0.33, p=0.74), but significant findings both post-rehab to one-year follow-up (z=-2.37, p=0.02) and pre-rehab to one-year follow-up (z=-2.59, p=0.01). Again, referring back to table 12.6 it appears that the choice of type of spread also moved in an unhealthier direction over time. The pattern of changes in lifestyle factors will now be illustrated by a series of bar charts, starting with smoking.

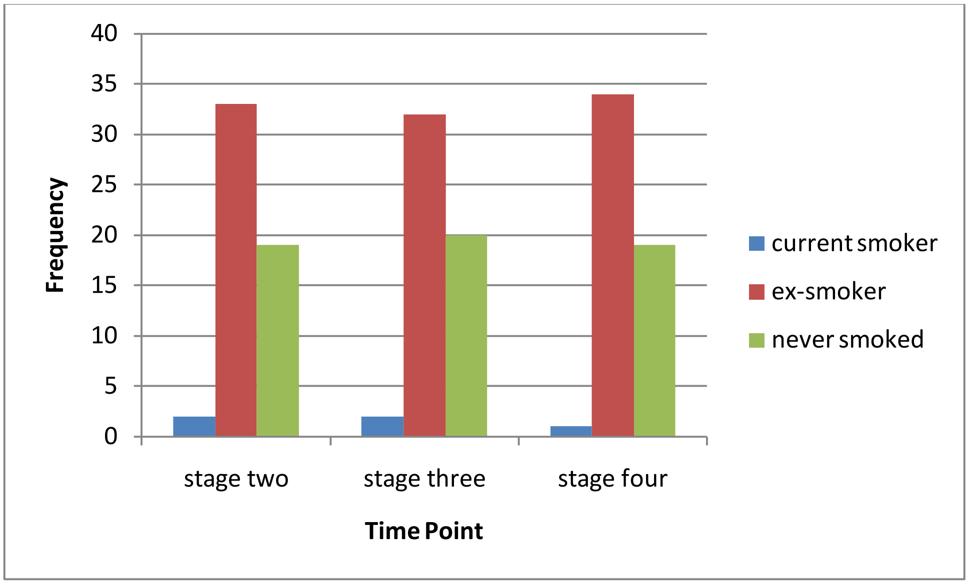

Figure 12.2 A bar chart to illustrate changes in smoking behaviour over time.

It can be seen from the figure 12.2 that there was little variation in the number of participants in each category at the three time-points, with just one individual giving up smoking between stages three (post-rehab) and four (one-year follow-up), and a further individual appearing confused over their status as a never or ex-smoker at stage three. The bar chart of alcohol changes is shown below.

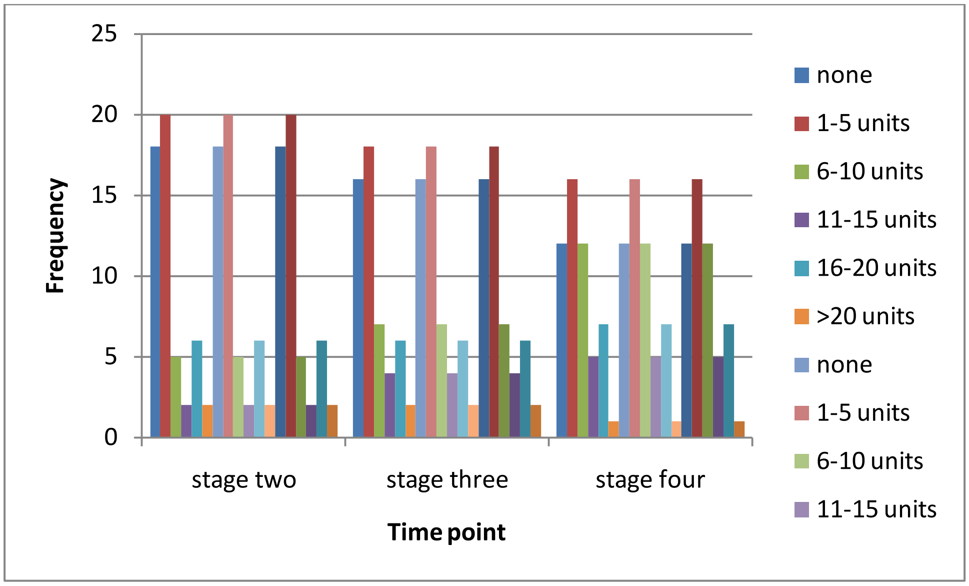

Figure 12.3 A bar chart to illustrate changes in alcohol consumption over time

The alcohol chart demonstrates more variation than the smoking one, which is reflected in the significant Friedman's test previously reported. At all stages the majority of participants were consuming less than 6 units per week, but there was an increase in moderate to heavy drinking at stages three and four, indicating a trend to heavier drinking. However, it is often recommended that a glass (1 unit) of red wine a day may be beneficial to the health of the heart so those shifting from less than 6 units to 6 to 10 units could merely be following medical advice. The data for cereal choice will now be discussed.

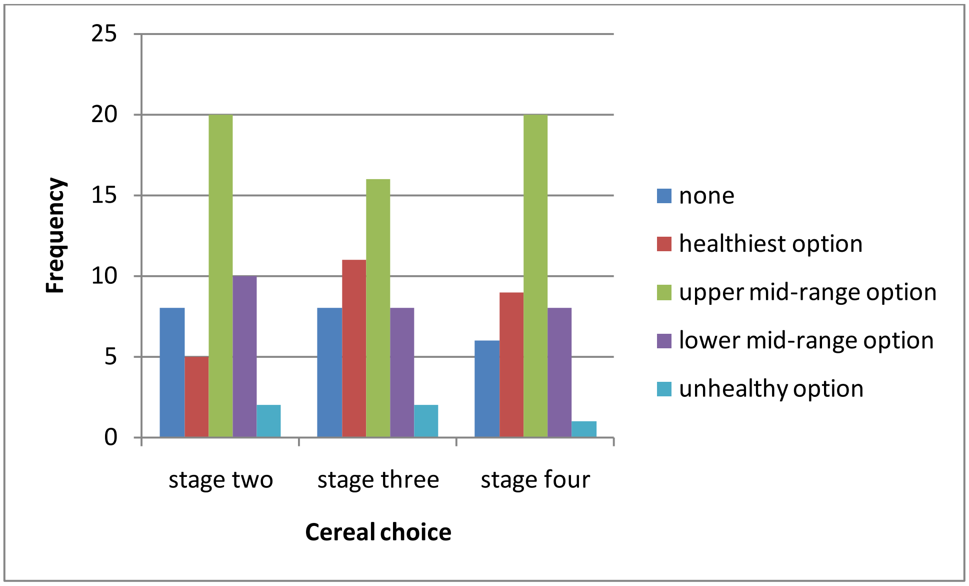

Figure 12.4 A bar chart to illustrate changes in cereal choice over time

It can be seen that there was an increase in choosing the healthiest option over time (porridge), though this did drop off slightly at stage four, but this change was not significant. There was also a very slight drop off in the choice of the unhealthiest option (for example, muesli). At all stages though the most popular option was the healthier of the two mid-range options, with the number of participants choosing this type of cereal identical at stages two (pre-rehabilitation) and four (one-year follow-up). There were few changes in behaviour for either sugar consumption or milk choice, as shown in figures 12.5 and 12.6.

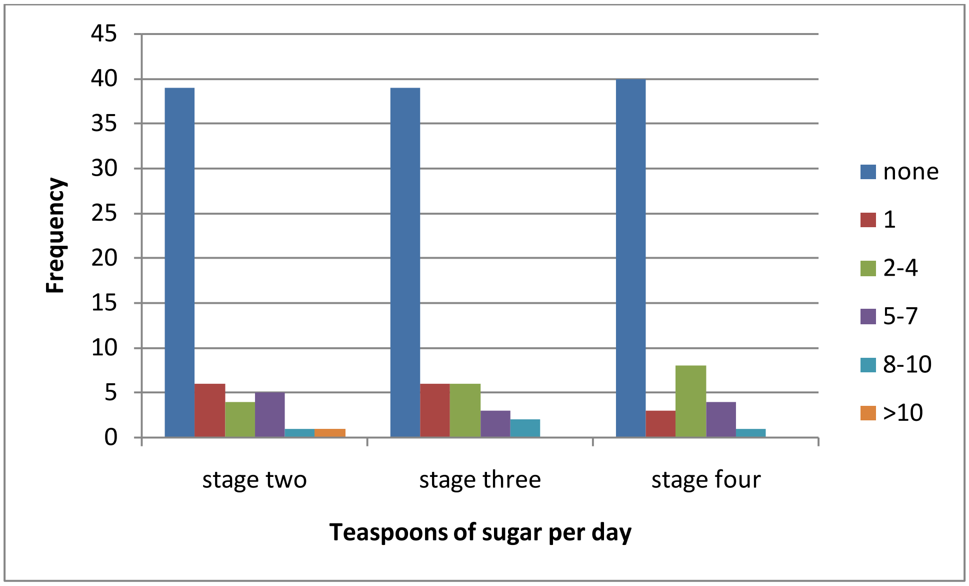

Figure 12.5 A bar chart to illustrate changes in sugar consumption over time

It can be seen from the above figure that at all stages the most frequent response was no sugar, with a slight increase in moderate sugar consumption by one-year follow-up (< 5 teaspoons) and a corresponding trend to reduce higher consumption levels. In all cases, however, these changes were not significant.

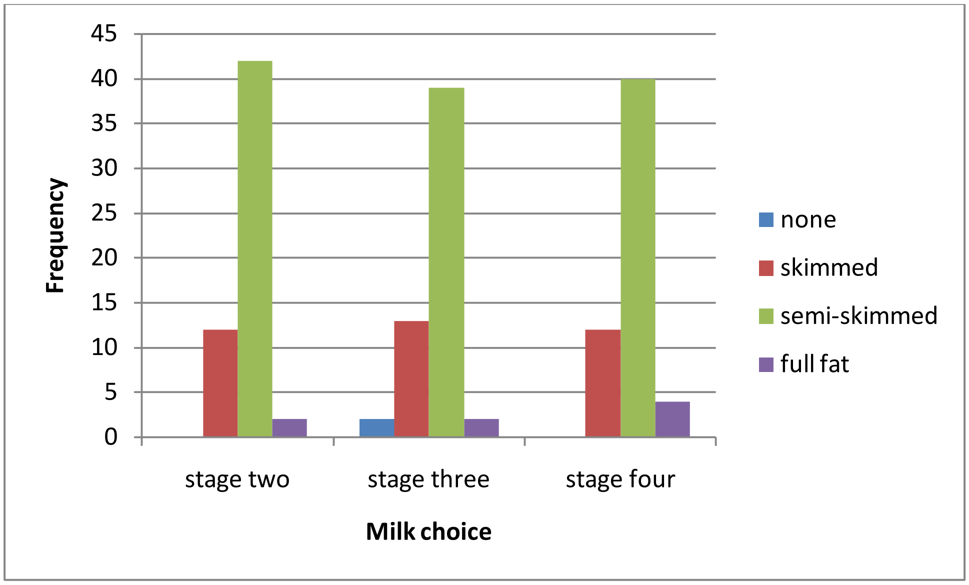

Figure 12.6 A bar chart to illustrate changes in milk choice over time

Figure 12.6 shows an initial slight increase in patients choosing the healthiest option (skimmed milk), with this returning to pre-rehabilitation levels at one-year follow-up. There was however, a slight increase in the consumption of the unhealthiest option at one-year follow-up. As with the sugar results detailed above, all these changes were non-significant. The spread choice changes are illustrated in figure 12.7.

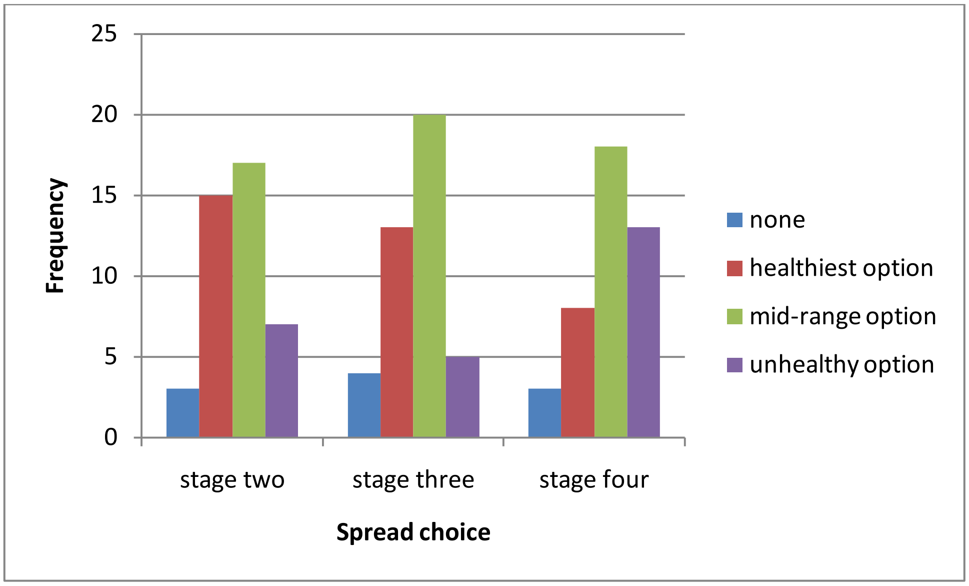

Figure 12.7 A bar chart to illustrate changes in spread choice over time

It can be seen from the above figure that the majority of the differences portrayed seemed to show changes over the longer term, which reflects the significant Friedman's findings reported earlier. Next the data for changes in fat choice for cooking will be presented.

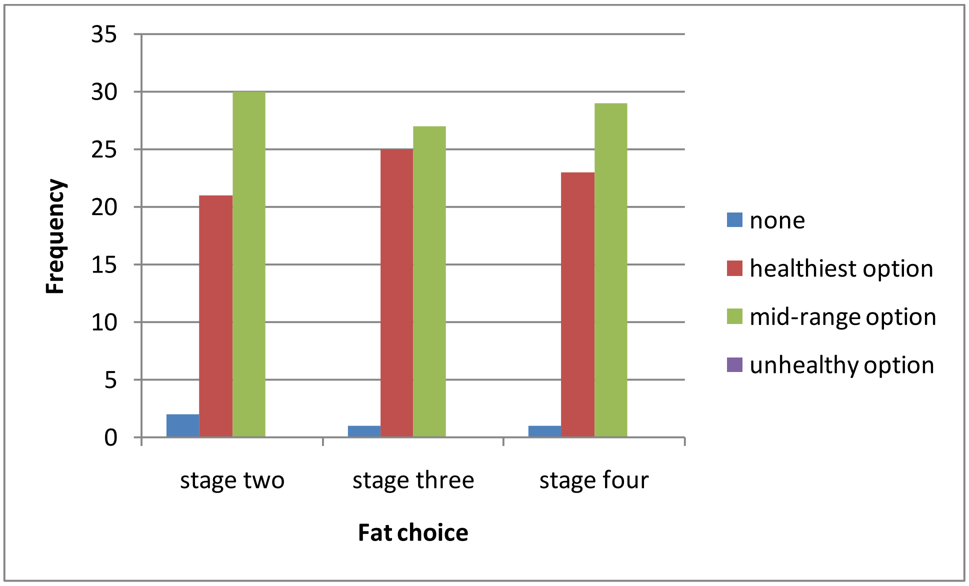

Figure 12.8 A bar chart to illustrate changes in fat choice over time

From figure 12.8 it can be seen that there is a slight change to the healthy option from the mid-range option between stages two (pre-rehabilitation) to three (post-rehabilitation), however this is not significant and the individuals seem to be returning to their previous behaviour by the final stage (one-year follow-up). Next the findings for bread choice will be given.

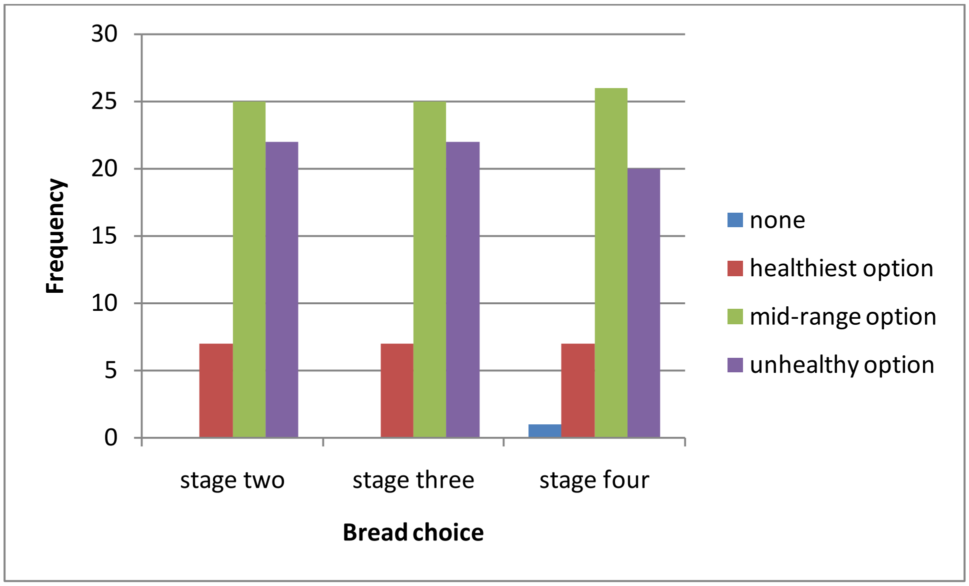

Figure 12.9 A bar chart to illustrate changes in bread choice over time

It can be seen from the above figure that there is a slight change in behaviour between stages three and four, from the unhealthiest option to the mid-range option, but this is not significant. Finally, the findings for changes in cheese choice will be given in figure 12.10.

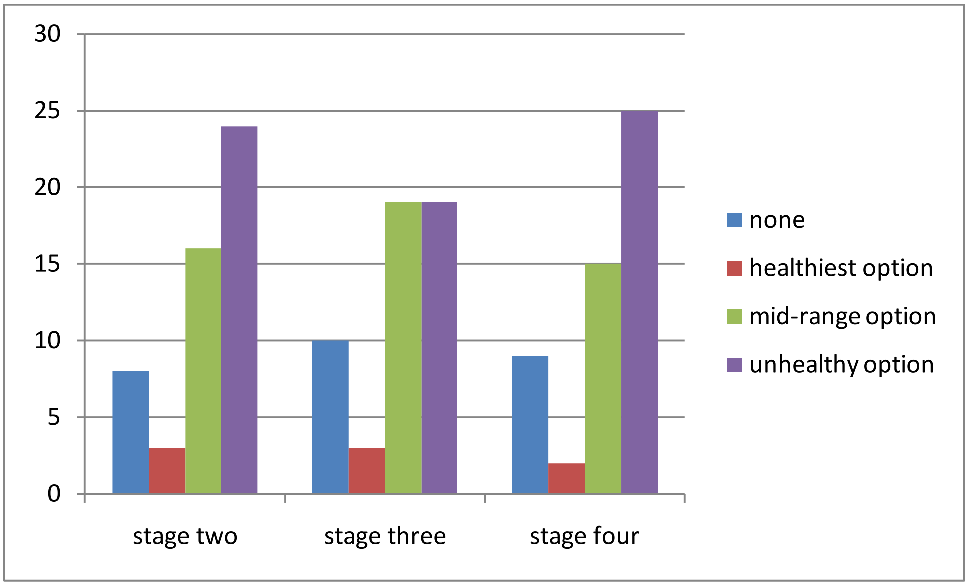

Figure 12.10 A bar chart to illustrate changes in cheese choice over time

As can be seen in figure 12.10 there is a decline in those choosing the unhealthiest option from stage two (pre-rehabilitation) to stage three (post-rehabilitation), indicating a possible beneficial effect of cardiac rehabilitation but changes were to the mid-range rather than healthiest option, and in addition there was an increase in those choosing the unhealthiest option in the longer-term. Thus, any beneficial changes due to rehabilitation were not maintained, as well as not being significant.

12.5.1 Summary and preliminary discussion of changes in lifestyle variables over time

Overall, it can be seen that there were few changes in lifestyle variables over the various time-points. Only the patients' consumption of alcohol and the type of spread used show significant changes, and in both cases these were moves towards unhealthier lifestyle choices. These changes were also not demonstrated as being directly linked to the cardiac rehabilitation programmes as the values for these variables were not significantly different between the pre-and post-rehabilitation time-points. There were positive changes (that is, moves towards a healthier choice of product or consumption rate) over the course of the cardiac rehabilitation programme for many of the other dietary variables (fat, cereal, cheese, sugar and milk); however, these were not significant and for all but the sugar variable by the one-year follow-up period these changes had reversed. Indeed, for all but the cereal variable the frequency values for each dietary factor returned at least to the pre-rehabilitation level. Therefore, if the dietary component of the cardiac rehabilitation programme is having an effect it is of an insignificant level, and has a short-term effect only.

For the smoking variable there appears to be very little change at all, and none were demonstrated between stages two and three, so do not appear to be directly linked to the cardiac rehabilitation programme. It should be noted though that for all the lifestyle variables whether that particular individual attended educational sessions on healthy eating and lifestyle changes was not controlled for due to the poor data available in patient records. Therefore, whether the educational aspects of the cardiac rehabilitation programme actually do influence lifestyle changes is still not totally clear. In order to assess this as far as is possible, due to the incomplete nature of the rehabilitation records; the next section will look at whether simply attending rehabilitation affected lifestyle change. Due to the lack of variance in the majority of the lifestyle variables, this analysis will only look at the alcohol and spread variables.

12.6 Associations between attending rehabilitation on lifestyle change

This analysis was carried out using purely categorical data – the numbers of attenders and non-attenders versus the numbers in each of the lifestyle change categories (improved, unchanged and worsened). The improved category signified a healthier choice of spread or a reduction in alcohol consumption, unchanged indicated no change in choice or consumption level and worsened indicated an unhealthier choice or increased consumption. These categories were calculated for two different time points – rehabilitation, where changes from time-point two to three were calculated, and long-term, where changes from time-point two to four were calculated. These findings are illustrated in the following figures, with alcohol changes detailed first.

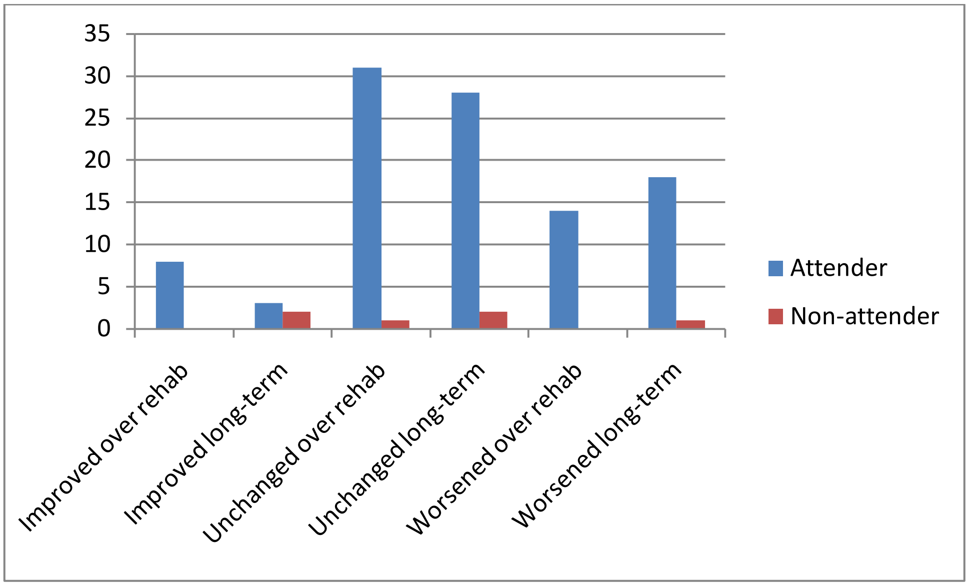

Figure 12.11 Number of attenders and non-attenders in each category for alcohol consumption

The above bar chart shows that the majority of the attenders either did not change the amount of alcohol they consumed or increased their consumption over the longer term in particular. There were very few participants in the non-attender category, so it is not really possible to make meaningful comments on their behaviour change but they did appear to show a greater proportion in the reduced alcohol or unchanged consumption in the longer term. The data for spread choice changes will now be presented in figure 12.12.

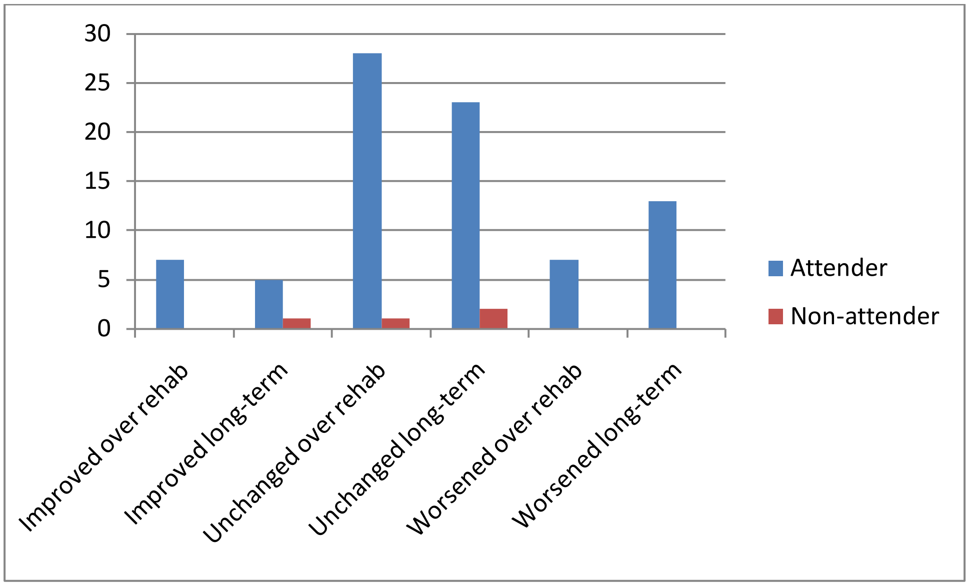

Figure 12.12 Number of attenders and non-attenders in each category for spread choice

As with the alcohol data there are very few participants in the non-attenders group, for the attenders again there was a greater proportion of respondents in the unchanged or switched to an unhealthier spread categories than the improved choice category.

12.6.1 Discussion of effects of attending rehabilitation on lifestyle change

From the results on the previous stage it seems clear that in this case attending rehabilitation appears to have few positive effects on lifestyle, which indicates that these particular rehabilitation programmes may not be fulfilling the main goals of such programmes (Savage et al., 2002; Timlin et al., 2002). In the following section, whether the initial (pre-surgery) and pre-rehabilitation IP and coping variables are associated with lifestyle changes will be examined. As in this section, due to the lack of variance in the majority of the lifestyle variables, this analysis looked only at the alcohol and spread variables.

12.7 Exploring the associations between IPs, coping and lifestyle changes

As in the previous section the lifestyle change data was grouped into three categories – improved, unchanged and worsened. Eight one-way ANOVAs were then performed to see if the IPs and coping variable scores pre-surgery and pre-rehabilitation differed according to category of lifestyle changes of the participants. For the purpose of this analysis two of the previously used IP variables were excluded (the cause variables, heredity and poor medical care) as they were single item only variables derived from the cause subscale of the IPQ-R. Initial means, standard deviations and ANOVA results for the change groupings are shown in tables 12.7 to 12.14 below. These are then followed in each case by the ANOVA analysis. Due to the multiple comparisons being made a Bonferroni correction was applied in each case. Therefore, for the ANOVAs examining the IP variables (11 variables) the significance level was adjusted from 0.05 to 0.005, and for the coping variable (4 variables) the significance level was adjusted to 0.0125. Initially the IP and coping variables pre-surgery will be presented.

Table 12.7 Means, standard deviations and ANOVA findings of the pre-surgery IP and coping variables for alcohol consumption changes from pre-rehab to post-rehab

	Improved (N=12) Mean (s.d.)	*Unchanged (N=32) Mean (s.d.)*	*Worsened (N=15) Mean (s.d.)*	*Anova results F(2,56) (p)*
Timeline – acute/chronic	20.33 (4.10)	19.63 (5.03)	19.33 (4.59)	0.155 (0.86)
Timeline – cyclical	12.33 (4.08)	10.63 (3.45)	9.60 (2.87)	2.111 (0.13)
Consequences	21.00 (4.18)	21.32 (2.93)	22.33 (5.26)	0.479 (0.62)
Personal control	22.00 (3.30)	21.59 (4.38)	22.60 (3.80)	0.318 (0.73)
Treatment control	21.17 (2.13)	19.84 (2.25)	20.87 (3.18)	1.625 (0.21)
Illness coherence	18.92 (4.01)	18.63 (3.00)	19.47 (3.52)	0.322 (0.73)
Emotional representations	19.08 (5.30)	18.19 (3.50)	19.00 (5.57)	0.265 (0.77)
Identity	5.42 (2.64)	4.25 (2.89)	4.80 (1.94)	0.902 (0.41)
Psychological attributions	17.00 (4.37)	14.69 (4.05)	13.60 (5.42)	1.974 (0.15)
External factors	14.67 (3.96)	15.19 (2.97)	13.33 (4.35)	1.385 (0.26)
Behavioural risk factors	11.83 (3.30)	9.78 (2.73)	12.09 (3.53)	3.780 (0.03)
Palliative coping	24.58 (5.82)	23.56 (4.44)	25.93 (5.92)	1.106 (0.34)
Instrumental coping	32.75 (4.16)	32.28 (4.47)	34.40 (3.76)	1.287 (0.28)
Distraction	23.83 (5.49)	22.69 (4.75)	24.13 (6.09)	0.466 (0.63)
Emotional preoccupation	21.08 (6.40)	21.19 (5.63)	21.80 (6.49)	0.065 (0.94)

It can be seen that the majority of participants fell into the unchanged alcohol consumption category, with the other participants being almost evenly split between the improved and worsened categories. The improved group believed that their condition was more chronic, and more likely to be episodic in nature, but these differences were not significant.

For the other main IP variables there appears to be little difference between the three groups which is backed up by the ANOVA analysis. The improved group reported more initial symptoms, but again this was not a significant finding. In terms of the causes of their cardiac problems the worsened group were more likely to see their cardiac problems as caused by their own behaviour prior to surgery than the other groups; however this finding was non-significant once the Bonferroni correction was applied. The other cause variables were non-significant. There were also no significant differences between the groups for the four coping variables. The changes in alcohol consumption long-term will now be discussed.

Table 12.8 Means, standard deviations and ANOVA findings of the pre-surgery IP and coping variables for alcohol consumption changes from pre-rehab to one-year follow-up

	Improved Mean (s.d.) N=8	*Unchanged Mean (s.d.) N=31*	*Worsened Mean (s.d.) N=19*	*Anova results F(2,55) (p)*
Timeline – acute/chronic	20.63 (5.40)	19.74 (4.64)	18.79 (4.92)	0.457 (0.64)
Timeline – cyclical	14.63 (4.47)	10.68 (3.46)	9.53 (2.97)	6.200 (0.004)
Consequences	21.75 (4.50)	21.20 (3.33)	21.68 (4.84)	0.113 (0.89)
Personal control	21.38 (5.24)	21.58 (4.57)	22.32 (3.48)	0.212 (0.81)
Treatment control	20.13 (3.31)	20.06 (2.35)	21.05 (2.57)	0.927 (0.40)
Illness coherence	17.13 (4.82)	19.16 (3.31)	20.21 (2.49)	2.459 (0.10)
Emotional representations	19.75 (5.39)	18.00 (4.53)	19.05 (4.60)	0.587 (0.56)
Identity	5.38 (2.88)	4.23 (2.94)	4.89 (1.60)	0.818 (0.45)
Psychological attributions	17.25 (4.68)	14.00 (4.41)	14.21 (4.34)	1.787 (0.18)
External factors	14.88 (4.58)	15.03 (3.09)	13.79 (3.85)	0.741 (0.48)
Behavioural risk factors	12.38 (3.38)	9.81 (2.87)	11.60 (2.95)	3.549 (0.04)
Palliative coping	25.13 (5.87)	23.45 (5.14)	24.95 (6.90)	0.509 (0.60)
Instrumental coping	32.00 (3.38)	33.27 (4.60)	32.47 (5.30)	0.315 (0.73)
Distraction	23.75 (3.88)	22.55 (5.46)	23.00 (5.95)	0.163 (0.85)
Emotional preoccupation	21.00 (7.78)	20.39 (5.67)	22.11 (6.74)	0.434 (0.65)

From table 12.8 it can again be seen that the unchanged group was by far the largest, however, in this case the improved group was much smaller than in the previous analysis. Again, the improved group thought their cardiac problems were more chronic and more likely to be episodic. For the timeline – acute/chronic variable this was a non-significant difference, but for the episodic variable this was a significant finding. Post-hoc analysis using the Games-Howell procedure indicated that the improved group were significantly more likely to see their problems as more episodic than the worsened group (p=0.036), but there were no differences between the improved and unchanged groups (p=0.102) or the unchanged and worsened groups (p=0.432).

Interestingly, across this time span the belief that their own behaviour prior to surgery caused their cardiac problems was greatest in the improved group. As in the previous analysis this finding was non-significant once the Bonferroni correction was applied. The majority of the other IP variables followed a similar pattern to the short-term alcohol changes detailed earlier, except for the illness coherence variable where the improved group seemed to have a lower understanding of their cardiac problems than the other two groups. ANOVA analysis indicated that all these findings were non-significant. The coping variables also demonstrated no significant differences between the three groups. Table 12.9 overleaf shows the results for the short-term change in the choice of spread variable.

Table 12.9 Means, standard deviations and ANOVA findings of the pre-surgery IP and coping variables for spread choice change from pre-rehab to post-rehab

	Improved Mean (s.d.) N=8	*Unchanged Mean (s.d.) N=34*	*Worsened Mean (s.d.) N=7*	*Anova results F(2,46) (p)*
Timeline – acute/chronic	19.50 (4.28)	19.94 (4.70)	21.43 (4.83)	0.371 (0.69)
Timeline – cyclical	10.88 (3.48)	10.97 (3.62)	9.71 (3.20)	0.368 (0.69)
Consequences	20.13 (3.36)	21.68 (4.18)	21.14 (4.49)	0.471 (0.63)
Personal control	19.88 (4.19)	22.24 (3.89)	22.14 (4.14)	1.171 (0.32)
Treatment control	19.25 (2.38)	20.71 (2.18)	19.71 (2.69)	1.609 (0.21)
Illness coherence	18.13 (1.96)	19.12 (3.65)	18.29 (3.77)	0.369 (0.69)
Emotional representations	18.25 (2.44)	18.38 (4.70)	18.71 (6.10)	0.020 (0.98)
Identity	4.38 (2.72)	4.68 (2.16)	3.43 (2.94)	0.814 (0.45)
Psychological attributions	15.00 (4.31)	15.12 (4.79)	14.29 (3.64)	0.096 (0.91)
External factors	16.00 (4.14)	13.76 (3.73)	15.86 (1.68)	1.895 (0.16)
Behavioural risk factors	10.00 (3.96)	10.75 (3.38)	10.57 (1.90)	0.163 (0.85)
Palliative coping	25.50 (2.62)	24.65 (4.64)	20.71 (9.38)	1.882 (0.16)
Instrumental coping	31.88 (4.09)	33.47 (3.86)	29.43 (4.72)	3.114 (0.05)
Distraction	24.50 (6.07)	23.38 (4.99)	20.57 (6.78)	1.068 (0.35)
Emotional preoccupation	22.50 (5.29)	21.62 (6.16)	19.71 (6.53)	0.416 (0.66)

Again the majority of the participants were in the unchanged group, with almost even numbers in the other two groups (improved and worsened). The distribution pattern of the means for the three groups was very different than for the alcohol change variables. The timeline – acute/chronic variable was smaller for the improved group, implying that these participants saw their cardiac problems as less chronic than the other groups, though this difference was not significant. The other time variable was highest for the unchanged group and lowest for the worsened group, though these differences were only small and also non-significant. This pattern was also seen for the identity variable.

For the main IP variables there was a common trend for the means to be lowest in the improved group, implying that prior to surgery they saw their cardiac problems as having fewer consequences on their lives, a lower sense of personal and treatment control, less understanding of their cardiac problems, and less emotional consequences. However, none of these differences were significant.

For the cause derived IP variables there were few differences between the three groups, with only a lower mean for the unchanged group for the external factors standing out. However, there were no significant between group differences on any of the cause variables. The worsened group displayed lower means for all the coping variables; but again there were no significant findings. The findings for the long-term change in spread choice will now be discussed. The results are displayed in table 12.10 overleaf.

Table 12.10 Means, standard deviations and ANOVA findings of the pre-surgery IP and coping variables for spread choice change from pre-rehab to one-year follow-up

	Improved Mean (s.d.) N=6	*Unchanged Mean (s.d.) N=29*	*Worsened Mean (s.d.) N=13*	*Anova results F(2,45) (p)*
Timeline – acute/chronic	19.17 (5.67)	18.79 (4.69)	22.23 (4.21)	2.468 (0.10)
Timeline – cyclical	11.67 (5.39)	10.34 (3.33)	11.08 (3.99)	0.386 (0.68)
Consequences	21.00 (4.43)	21.66 (3.87)	21.77 (5.05)	0.072 (0.93)
Personal control	17.00 (5.29)	22.62 (3.93)	20.85 (4.22)	4.671 (0.01)
Treatment control	19.50 (1.98)	20.55 (2.80)	20.77 (2.32)	0.520 (0.60)
Illness coherence	19.33 (1.63)	18.90 (3.66)	19.46 (4.14)	0.122 (0.89)
Emotional representations	20.33 (4.89)	18.34 (4.73)	19.92 (4.75)	0.756 (0.48)
Identity	5.67 (1.86)	4.69 (2.54)	4.31 (2.32)	0.653 (0.53)
Psychological attributions	13.67 (3.14)	14.59 (4.95)	15.08 (4.68)	0.184 (0.83)
External factors	16.33 (1.86)	13.72 (4.08)	14.85 (3.31)	1.397 (0.26)
Behavioural risk factors	9.33 (2.50)	10.59 (3.24)	10.72 (3.20)	0.450 (0.64)
Palliative coping	27.33 (3.67)	23.83 (4.38)	26.00 (7.30)	1.527 (0.23)
Instrumental coping	31.50 (5.13)	33.69 (4.00)	32.92 (4.35)	0.705 (0.05)
Distraction	23.17 (4.17)	23.79 (5.38)	23.08 (5.06)	0.102 (0.90)
Emotional preoccupation	23.83 (5.74)	20.62 (5.88)	24.46 (6.23)	2.169 (0.13)

For this change variable the number of participants in the unchanged group was reduced, with more participants being classified in the worsened category than for the short-term spread choice variable. The improved category is made up of far fewer individuals than previously. While the pattern of means for the timeline – acute/chronic variable is similar to the other spread variable, the timeline cyclical variable is more akin to the alcohol findings, with the improved group displaying a slightly higher mean than the other groups. As in the previous spread variable for both these variables any differences were non-significant.

The pattern of results were variable for the main IP variables, with the improved group having lower means for the consequences, personal control, treatment control and identity variables; but higher means for the emotional representations and identity variables. This implies that this group saw fewer effects of their cardiac problems on their life, but also saw lower levels of both personal and medical control over their situation, a greater number of symptoms and, consequently, higher levels of distress being experienced. As in previous analyses, though, these differences were not significant.

The cause variables saw the lowest means for the improved group for the psychological attributions and behavioural risk factors variables, but also the highest mean for this group for the external factors variable. This implies that the improved group were more likely to see the onset of their cardiac problems as beyond their control than the other groups. However, analysis revealed these differences to be non-significant once more. The coping variables also demonstrated a strange pattern of results, with the unchanged group having higher means for instrumental coping, but lower means for the palliative and emotional preoccupation variables, Again, these findings were non-significant. These analyses will now be repeated for the IP and coping variables collected at the second time point – pre-rehabilitation.

Table 12.11 Means, standard deviations and ANOVA findings of the post-surgery IP and coping variables for alcohol consumption changes from pre-rehab to post-rehab

	Improved (N=9) Mean (s.d.)	*Unchanged (N=24) Mean (s.d.)*	*Worsened (N=10) Mean (s.d.)*	*Anova results F(2,40) (p)*
Timeline – acute/chronic	17.44 (5.90)	17.83 (4.49)	15.80 (5.43)	0.586 (0.56)
Timeline – cyclical	9.89 (3.48)	10.88 (2.69)	9.20 (2.35)	1.376 (0.26)
Consequences	18.22 (5.19)	19.57 (4.33)	18.10 (6.15)	0.428 (0.66)
Personal control	23.78 (2.68)	22.50 (2.17)	20.90 (4.41)	2.339 (0.11)
Treatment control	18.67 (3.08)	19.38 (2.30)	19.30 (3.74)	0.210 (0.81)
Illness coherence	19.56 (1.51)	19.04 (3.56)	19.48 (2.51)	0.131 (0.88)
Emotional representations	15.00 (3.84)	16.29 (4.93)	13.90 (6.08)	0.848 (0.44)
Identity	3.33 (2.35)	5.29 (2.87)	3.60 (2.88)	2.303 (0.11)
Psychological attributions	15.22 (2.64)	14.78 (3.90)	15.40 (3.78)	0.122 (0.89)
External factors	15.67 (2.18)	14.60 (3.31)	15.46 (1.26)	0.648 (0.53)
Behavioural risk factors	11.11 (2.71)	10.49 (2.83)	11.13 (3.19)	0.257 (0.77)
Palliative coping	24.22 (6.16)	24.42 (5.06)	24.00 (5.96)	0.021 (0.98)
Instrumental coping	31.33 (3.54)	32.73 (7.65)	34.30 (4.00)	0.528 (0.59)
Distraction	22.56 (5.90)	25.17 (4.82)	22.70 (6.52)	1.142 (0.33)
Emotional preoccupation	20.89 (6.86)	20.21 (6.34)	21.90 (7.85)	0.219 (0.81)

In this set of analysis the largest group was those whose alcohol consumption was unchanged, with the number of patients in the other two groups (improved and worsened) being almost identical to each other. Unlike the previous analysis which looked at initial IP and coping variables rather than post-surgery variables there was less of an overall pattern to the findings. The unchanged group had the highest scores for many of the main IP variables. This implies that this group experienced more symptoms post-surgery, saw their cardiac problems as more persistent and episodic in nature, had a greater belief in the success of their treatment, but experienced more negative emotions and greater consequences due to their condition. However, none of these between group findings were significant. For the personal control variable the highest scores were for the improved group, implying that having a strong sense of personal control was associated with reduced alcohol intake but this difference was not significant. The unchanged group also had a poorer understanding of their illness, but again this was not a significant finding. The cause variables consistently demonstrated the lowest scores for the unchanged group, implying that this group were less likely to use these coping strategies post-surgery. As in the IP variables, none of these differences were significant. The findings for the long-term alcohol consumption changes will now be presented.

Table 12.12 Means, standard deviations and ANOVA findings of the post-surgery IP and coping variables for alcohol consumption changes from pre-rehab to one-year follow-up

	Improved (N=5) Mean (s.d.)	*Unchanged (N=24) Mean (s.d.)*	*Worsened (N=13) Mean (s.d.)*	*Anova results F(2,41) (p)*
Timeline – acute/chronic	16.00 (5.92)	18.04 (4.60)	15.77 (5.76)	0.957 (0.39)
Timeline – cyclical	10.60 (3.71)	10.92 (2.86)	9.46 (1.85)	1.236 (0.30)
Consequences	17.40 (4.93)	19.48 (4.70)	18.23 (4.92)	0.546 (0.58)
Personal control	23.80 (1.10)	22.75 (2.67)	22.23 (4.46)	0.429 (0.65)
Treatment control	19.40 (1.52)	19.41 (2.50)	19.61 (3.33)	0.025 (0.98)
Illness coherence	20.40 (1.67)	18.88 (3.11)	19.67 (2.66)	0.745 (0.48)
Emotional representations	15.60 (2.97)	16.21 (5.18)	14.15 (5.90)	0.650 (0.53)
Identity	4.00 (2.92)	4.92 (2.59)	3.62 (2.57)	1.111 (0.34)
Psychological attributions	15.20 (3.83)	15.67 (3.13)	15.46 (4.37)	0.040 (0.96)
External factors	15.20 (2.95)	14.79 (3.27)	15.43 (1.38)	0.231 (0.80)
Behavioural risk factors	10.20 (2.49)	10.67 (3.25)	10.64 (3.03)	0.048 (0.95)
Palliative coping	22.20 (6.72)	23.79 (5.69)	23.77 (5.33)	0.170 (0.84)
Instrumental coping	31.60 (3.98)	32.57 (7.90)	33.00 (4.53)	0.079 (0.92)
Distraction	25.00 (4.80)	23.79 (5.85)	22.77 (5.64)	0.303 (0.74)
Emotional preoccupation	20.00 (6.82)	19.09 (6.10)	22.62 (8.57)	1.068 (0.35)

The numbers in the improved group were lower in this time frame, with the loss in numbers all transferring to the worsened group. As in the previous analysis on the pre-rehabilitation IP and coping variables and alcohol consumption for the majority of the main IP variables the unchanged group reported higher scores. This implies that this group were more likely to see their cardiac problems as chronic and episodic. They also reported more symptoms related to their cardiac condition, more consequences of their illness, and greater psychological distress. This group also showed a poorer understanding of their cardiac problems than patients in the other two groups. However, none of these differences were significant.

Interestingly, the worsened group scored lower on personal control and higher on treatment control than the other groups, while also reporting fewer symptoms and less emotional distress; but the ANOVA statistics were not significant. For the cause variables there was no consistent pattern in the mean scores, and no significant differences were found between the groups. The improved group were less likely to use palliative and instrumental coping, and more likely to use distraction than the other groups; however, none of the coping variables demonstrated significant differences between the groups. The analysis for the choice of spread variable will now be detailed.

Table 12.13 Means, standard deviations and ANOVA findings of the post-surgery IP and coping variables for spread choice changes from pre-rehab to post-rehab

	Improved (N=6) Mean (s.d.)	*Unchanged (N=25) Mean (s.d.)*	*Worsened (N=5) Mean (s.d.)*	*Anova results F(2,35) (p)*
Timeline – acute/chronic	17.00 (4.73)	17.72 (5.38)	18.20 (4.55)	0.077 (0.93)
Timeline – cyclical	9.83 (3.06)	10.24 (2.77)	10.20 (3.03)	0.050 (0.95)
Consequences	16.50 (4.04)	18.66 (5.15)	22.60 (2.70)	2.306 (0.12)
Personal control	21.50 (2.81)	22.52 (3.57)	23.60 (1.52)	0.561 (0.58)
Treatment control	19.00 (3.22)	19.40 (2.78)	19.00 (2.35)	0.078 (0.93)
Illness coherence	19.17 (4.79)	19.31 (2.31)	18.60 (1.67)	0.137 (0.87)
Emotional representations	14.67 (8.21)	15.12 (5.00)	16.20 (2.59)	0.117 (0.89)
Identity	3.33 (2.50)	4.20 (2.42)	5.60 (3.85)	1.018 (0.37)
Psychological attributions	13.60 (5.65)	15.52 (2.99)	15.60 (2.88)	0.759 (0.48)
External factors	15.25 (3.57)	14.82 (2.51)	15.60 (2.30)	0.206 (0.81)
Behavioural risk factors	10.11 (2.21)	11.41 (2.57)	9.20 (3.63)	1.734 (0.19)
Palliative coping	25.67 (1.86)	24.88 (4.50)	21.60(11.06)	0.892 (0.42)
Instrumental coping	35.83 (13.11)	32.50 (4.01)	29.40 (5.73)	1.368 (0.27)
Distraction	26.00 (3.95)	24.04 (4.91)	19.40 (7.70)	2.345 (0.11)
Emotional preoccupation	23.17 (3.55)	21.57 (7.00)	18.40 (7.23)	0.733 (0.49)

For this analysis the distribution of patients across the three groups was similar to the short-term alcohol consumption choice analysis, with the largest group being those individuals who did not change their type of spread, with the numbers in the improved and worsened groups being similar to each other. However, the pattern of findings for this analysis was quite different to the previously reported findings.

The group whose choice of spread became unhealthier were more likely to see their cardiac problems as long-term, with greater consequences on their lives, had less understanding of their illness, and reported more symptoms and greater emotional distress. Interestingly, however, they reported a greater sense of personal control over their illness. None of the main IP findings showed significant differences between the three groups.

Looking at the cause variables the worsened group again scored higher for the psychological attributions and external factors variables, but lower than the other groups for behavioural risk factors. This implies that this group were less likely to believe their personal behaviour led to their cardiac problems. Again, though, there were no significant differences between these three groups. The improved group reported greater use of all four of the coping strategies, but this finding was non-significant. Finally in this section the choice of spread over a longer time-span will be examined.

Table 12.14 Means, standard deviations and ANOVA findings of the post-surgery IP and coping variables for spread choice changes from pre-rehab to one-year follow-up

	Improved (N=4) Mean (s.d.)	*Unchanged (N=22) Mean (s.d.)*	*Worsened (N=10) Mean (s.d.)*	*Anova results F(2,35) (p)*
Timeline – acute/chronic	16.75 (6.08)	18.41 (4.89)	15.60 (5.15)	1.094 (0.35)
Timeline – cyclical	9.25 (1.89)	10.68 (2.88)	9.60 (2.41)	0.853 (0.44)
Consequences	18.25 (6.24)	19.21 (5.19)	18.30 (4.08)	0.145 (0.87)
Personal control	22.25 (0.50)	21.36 (3.22)	25.00 (2.21)	5.743 (0.01)
Treatment control	19.00 (3.46)	18.68 (2.51)	20.80 (2.35)	2.362 (0.11)
Illness coherence	20.50 (2.52)	18.45 (2.67)	19.88 (2.97)	1.531 (0.23)
Emotional representations	13.00 (4.55)	16.73 (5.72)	14.10 (3.60)	1.478 (0.24)
Identity	3.50 (1.92)	4.82 (2.59)	4.00 (2.63)	0.663 (0.52)
Psychological attributions	13.50 (5.20)	15.77 (3.48)	15.40 (2.59)	0.730 (0.49)
External factors	15.75 (1.71)	14.50 (2.70)	16.16 (1.41)	1.909 (0.16)
Behavioural risk factors	9.00 (2.16)	10.86 (2.90)	13.33 (3.39)	0.684 (0.51)
Palliative coping	24.25 (2.87)	23.73 (4.33)	26.90 (6.67)	1.408 (0.26)
Instrumental coping	37.00(16.79)	33.07 (4.29)	31.30 (3.27)	1.155 (0.33)
Distraction	23.50 (3.11)	24.09 (5.75)	24.70 (5.72)	0.077 (0.93)
Emotional preoccupation	23.00 (3.56)	19.96 (5.95)	24.50 (8.02)	1.833 (0.18)

As in the previous long term findings reported there was a decline in the number of patients in the improved group. However, there was also a slight decline in the unchanged group and a consequent doubling in numbers of those in the worsened group. The findings in the above table are different to those in the previous table, with the unchanged group seeing their cardiac problems as more long lasting and episodic than the other groups. They also reported a greater level of consequences of their illness on their lives, more symptoms, less belief in the effectiveness of their treatment, poorer understanding of their condition and greater emotional distress. Overall, this implies this group had a more negative view of their illness than the other groups.

However, the group reporting the highest sense of personal control over their cardiac problems were those whose choice of spread became unhealthier. This group were also more likely to see their cardiac problems as caused by external factors and their own behaviour than the other groups. However, none of the IP variables showed significantly different findings between the three groups.

As in the previous analysis the improved group were more likely to seek out advice and information than the other groups, but for the other coping strategies the highest scores were reported by the worsened group. As in the analysis of illness perception variables above, these differences were not significant. Overall, no significant differences were found for pre-rehabilitation IP and coping variables between the three groups.

12.7.1 Summary and preliminary discussion of the lifestyle change analysis

From the above analysis it is clear that the few changes in behaviour demonstrated in the Friedman's analysis were reflected in the single significant finding reported for the pre-surgery episodic timeline variable when examining changes in long-term alcohol consumption. It is also interesting to note that the greatest number of participants did not in fact change their lifestyle behaviour, either in the short- or long-term. The single significant finding was that the long-term improved alcohol consumption group were more likely to see their cardiac problems as more episodic than the worsened group. It should be noted, however, that the sizes of the three groups were very dissimilar for all eight sets of analysis, with the improved group being relatively small. It is also of interest that none of the IP and coping variables at the time point immediately before starting rehabilitation showed any significant differences between the three change groups (improved, unchanged and worsened) in either the short or long-term. This indicates that the patients' beliefs about their cardiac condition and choice of coping strategy as they start their rehabilitation programme were not associated with their choice of spread and alcohol consumption.

12.8 Summary of findings

Due to the large volume of differing analyses carried out within this chapter a summary of the results are given in table 12.15.

Table 12.15 Summary of significant findings in Chapter 12

Attendance at Cardiac Rehabilitation	
1. Are there significant differences in IP and coping scores between attenders and non-attenders at cardiac rehabilitation?	See section 12.3
Pre-surgery	No
Pre-rehabilitation	No
2. Are IP and coping scores associated with the number of sessions of cardiac rehabilitation attended?	See section 12.4
Pre-surgery	IP Consequences significantly negatively correlated – greater the effect of their cardiac problems on their life the fewer sessions they attend
Pre-rehabilitation	IP Illness coherence significantly positively correlated – greater their understanding and knowledge of their cardiac problems the more sessions they attend
Changes in lifestyle factors over time	
3. Do changes occur in diet and smoking behaviour over time?	See section 12.5
Alcohol	Significantly greater alcohol consumption at 1-year follow-up than pre- or post-rehabilitation
Spread	Significantly unhealthier choice of spread at 1-year follow-up than at pre- or post-rehabilitation
4. Does attending rehabilitation lead to lifestyle change?	See section 12.6
No significant differences	
5. Are IP and coping variables scores significantly different in those whose behaviour changed (improved or worsened) than those whose behaviour stayed the same?	See section 12.7
Alcohol – over the long-term (pre-rehabilitation to 1-year follow-up) those who reduced their drinking were more likely to see their cardiac problems as episodic pre-surgery than those who increased their drinking	

12.9 Implications of findings

Overall, the results of this chapter imply that the cardiac rehabilitation that the participants were invited to attend failed to improve their lifestyle in the long-term, with only very small, non-significant improvements being demonstrated over the course of the rehabilitation programme. This is in contrast with the general aims of cardiac rehabilitation programmes (Savage, Lee, Harvey-Berino, Brochu, & Ades, 2002; Timlin, Shores, & Reicks, 2002). In addition, for the significantly changing variables (alcohol consumption and spread choice), the changes demonstrated a worsening in health choices. However, due to the fact that ethical permission was not granted to collect the lifestyle data pre-surgery, it cannot be ascertained how the participants' diet had changed from pre to post-surgery. For those patients undergoing the CABG procedure, who made up the bulk of the participants, the mere fact that they had undergone such a major, invasive procedure may have meant that they made dietary and other lifestyle changes prior to the pre-rehabilitation time point. That is, they changed their diet due to needing to undergo such a procedure, which may have emphasised the seriousness of their cardiac condition to them, or immediately after surgery before they were sent their second questionnaire pack. Under these circumstances any lack of changes or worsening of diet may have been due to the diet already having been improved prior to surgery and some slight reduction in adherence to this once they realised they had survived the surgical procedure. However, as noted above, in the absence of pre-surgery diet and lifestyle data, the above suggestions are speculative.

While certain IPs (controllability, consequences and time-cyclical) have been found to have a role in the attendance at cardiac rehabilitation in previous research (Petrie, Weinman, Sharpe, & Buckley, 1996; Whitmarsh et al., 2003), they appear to have little bearing here. As mentioned earlier in the chapter, however, the fact that the majority of participants were classed as attenders may have affected these findings as well as the timing of the data collection. The analysis that looked at the effect, if any, of IP and coping variables had on the number of sessions attended did find two significant findings, with IP consequences as measured pre-surgery being significantly negatively correlated with the number of sessions attended. However, this finding is in the opposite direction to prior research (Whitmarsh et al., 2003). The hypothesis put forward suggested that those choosing to attend cardiac rehabilitation would have greater beliefs in personal and treatment control, have experienced more severe consequences and attribute their cardiac problems to lifestyle choices can therefore be rejected.

In addition, while lifestyle factors are often attributed as causes of cardiac problems (Weinman et al., 2000), the findings reported in this chapter do not suggest that illness perceptions are related to changes in lifestyle behaviours during the course of a rehabilitation programme. However, if the Bonferroni correction is discounted, there are significant findings relating to pre-surgery behavioural risk factors (IP causes) and alcohol consumption. In the short-term (from pre- to post-rehabilitation) those who had a greater belief that their cardiac problems were due to their own behaviour were more likely to increase their drinking over that period, but over a longer time period (pre-rehabilitation to 1-year follow-up), higher “own behaviour” causal beliefs were associated with a reduction in alcohol consumption. The final hypothesis that those with higher treatment control beliefs, higher consequence beliefs, more attribution of cardiac problems to lifestyle choices and more negative emotional representations would make more positive lifestyle changes can therefore be rejected.

It should be noted, however, that the participant data in the lifestyle change sections of this analysis has not been controlled for whether the individual actually attended the rehabilitation programme, and, if so, whether they attended the dietary advice session. While this data is available for some of the Chester participants, for some there was no rehabilitation data in their medical files. Also, this data is recorded merely in terms of the planned education for that week. While the way the information is recorded means that patients’ attendance at the exercise half of the session can be accurately ascertained, whether they stayed on for the educational component is not known. For the Wrexham patients, the actual educational sessions they attended was not recorded. Therefore, the effects of the individual components of the rehabilitation programme on lifestyle behaviours cannot be fully ascertained. The nature of the cardiac rehabilitation programme at Chester may also have affected the findings, particularly for dietary factors where the input changed considerably over the course of data collection. Initially, general advice was given taken from the British Heart Foundation, then there was input from a student dietician, and finally by a fully qualified dietician. Additionally, while some researchers have included alcohol consumption in their research dietary factors are generally examined merely in terms of fat consumption or by looking at obesity levels instead which may have affected the findings here.

Chapter 13: General discussion of results and overall conclusions

13.1 Introduction

This chapter will bring together the findings discussed in the previous three chapters and how they relate to the research questions set out in chapter five. How these findings compare to other research will also be addressed. The overall application of the CSM to the illness experience of this patient group (CABG and PTCA) in the present research will also be critically discussed. The present research will also be evaluated in terms of the methods and materials used. Finally, the overall conclusions and implications for practice will be drawn together. Of the 4 hypotheses put forward in chapter 5 two concern the prediction of QoL and two issues relating to cardiac rehabilitation attendance and behavioural change; firstly, the two QoL hypotheses will be discussed.

13.2 Prediction of Quality of Life

The two hypotheses relating to the prediction of QoL were tested across two chapters. The first (chapter 10) looked at the prediction of long-term QoL by pre-surgery IP and coping variables, while the second (chapter 11) looked the relationship between IPs, coping and QoL at each of the four time points (pre-surgery, post-surgery, post-rehabilitation and one-year post discharge). The first hypothesis was that those with poorer personal control beliefs, more severe beliefs of the consequences of their cardiac problems, less understanding of their condition, and more negative emotional representations would have poorer QoL; and the second was that there would be associations between the less adaptive coping strategies (emotional preoccupation and distraction) and poorer QoL, while those with better QoL would endorse instrumental coping strategies. In order to discuss the regression findings related to these two hypotheses clearly they will first be summarised within a table. The four time points will be represented by the numbers 1 to 4, with pre-surgery equalling 1, post-surgery 2, post-rehabilitation 3, and one-year follow-up 4. The QoL dimensions are represented by E emotion, P physical, and S social QoL.

Table 13.1 Summary of the QoL findings

	Chapter 10			*Chapter 11*		
	E	P	S	E	P	S
Hypothesis One						
Personal control			3	1	1	
Consequences	1	1	1	1	1	1
Illness coherence				2,4	4	4
Emotional representations	1,	1, 3	1	1,2,3,4	1,2,4	1,2,4
Hypothesis Two						
Emotional preoccupation			3,4	1,3,4	3,4	1,3,4
Distraction						
Instrumental coping				4		

It can be seen from the above table that both hypotheses are only partially supported across both sets of analyses. While there are a number of differences between the findings for the sets of analyses there are also a number of similarities, particularly for the consequences and emotional representations IPs. This is not surprising as it has been found that undergoing cardiac surgery itself does not necessarily lead to changes in mood or improve psychological adjustment (Crumlish, 1994; Genardini et al., 2008).

The longitudinal findings indicated that having more negative emotional representations prior to surgery predicted poor QoL across all domains of QoL at that time and physical QoL post-rehabilitation; while the cross-sectional findings also showed the predictive qualities of emotional representations across all domains of QoL pre-surgery, post-rehabilitation and at one-year follow-up, and emotional QoL post-surgery. The finding that emotional representations can predict more than the emotional domain of QoL has been found by others. For example Trovato et al. (2010) found that emotional representations were associated with physical QoL in those were just about to or who had just undergone PTCA. It should be noted though that across all QoL domains, emotional representations were not significant within the final regression models pre-surgery at all time points and cross-sectionally post-rehabilitation.

There are small differences between the longitudinal (chapter 10) and cross-sectional (chapter 11) findings. Longitudinally, pre-surgery emotional representations were not predictive of QoL post-surgery. However, in the cross-sectional findings there was a significant relationship between emotional representations and QoL post-surgery and post-rehabilitation. It should be noted that post-rehabilitation the strength of this relationship was slightly reduced and timeline-cyclical was generally the best predictor of QoL. These cross-sectional findings demonstrate how the correlates of IPs change over time; therefore there is a need to continually evaluate individual's emotional representations to identify those at risk of poor QoL.

Much of the previous research into IPs in cardiac patients has emphasised the importance of the controllability and consequences of the cardiac condition on outcome (e.g. Aalto et al., 2006; Lau-Walker et al, 2009; Stafford, Berk & Jackson, 2009) whereas in the present research more severe consequences were only found to be associated with QoL prior to surgery; treatment control has not predicted any QoL outcome; and personal control played only a minimal role at post-rehabilitation longitudinally, and pre-surgery cross-sectionally. However, these other studies did not measure emotional representations, which may contribute to the dissimilar findings.

Better predictors of QoL outcome than the cognitive IPs, both longitudinally and cross-sectionally, were the two coping variables – palliative coping and emotional preoccupation. This, together with the findings that illness coherence only consistently predicted QoL in the cross-sectional one-year follow-up stage, indicates that within the more complex predictions of hypotheses one and three that emotional representations and the emotional coping strategies (palliative coping and emotional preoccupation) they drive may be more consistent predictors of QoL, indeed in the longitudinal research the only predictor of post-surgery QoL was palliative coping. In support of this the more "cognitive" coping strategy of instrumental coping was not predictive of better QoL longitudinally, and only of emotional and overall QoL at the one year follow-up of the cross-sectional analysis. While this gives strength to the idea that the emotional representations and the emotion-regulating coping strategies they drive may be playing a more important role in predicting QoL, it should be borne in mind that there is a possible overlap in these constructs and QoL which may be influencing the findings.

Comparing the findings of this research with the findings detailed in the systematic review in chapter 4 reveals several differences. Aalto et al. (2006), carried out both cross-sectional and longitudinal analyses, as did the present research. Cross-sectionally, at baseline poor QoL was associated with increased symptoms, more severe consequences and a lower sense of controllability; increased symptoms were not predictive of poor QoL at follow-up one year later but the other IP variables were. As Aalto et al.'s patients all had established CHD they are most similar to the one-year follow-up time point in this research where the only similarity with their baseline findings was the association with increased symptoms. Stafford, Berk & Jackson (2009) had a participant group which were more similar to the present one, with their baseline being 3 months post-discharge after cardiac surgery or MI, with follow up 6 months later; therefore their baseline was equivalent to the post-rehabilitation stage of this research. Cross-sectionally, at baseline Stafford et al. found that physical QoL was associated with increased symptom load (identity) and a perception of more severe consequences; while mental QoL was also associated with increased symptoms, but also a poorer sense of personal control. These findings do not share any agreement with the findings cross-sectionally post-rehabilitation, though an increase in symptoms was associated with poorer physical and overall QoL at the one-year follow-up.

A very recently published study examined the effect of pre-surgery IPs on a range of outcomes including QoL (SF-12) and depression (HADS) 3 months later in CABG patients (Juergens, Seekatz, Moosdorf, Petrie & Rief, 2010). Interestingly these authors found no significant improvements in QoL over the 3 month time period while the findings from this research detailed in chapter 9 showed significant improvements in all domains of QoL from pre-surgery to post-rehabilitation. Juergens et al. found no significant associations between psychological distress (SF-12) and IPs, but did find associations between physical functioning (SF-12) and depression (HADS). Poorer physical functioning at follow-up was associated with a more chronic and episodic perception of timeline, and a perception of more severe consequences pre-surgery. Depression was also associated with these factors, as well as by a poorer understanding of their cardiac condition. Emotional representations were only associated with disability. From the research detailed in chapter 10 QoL post-rehabilitation was predicted by the episodic timeline variable pre-surgery, and consequences but for this variable the significant associations did not remain after the Bonferroni correction was applied. Hierarchical regressions were carried out by

Juergens et al. but these used a single score for the whole IPQ-R rather than individual subscales so direct comparisons cannot be made. Their analysis did show though that a more negative overall IP at baseline predicted poorer physical functioning and increased depression at follow-up. While these findings do have more in common with this research than that of Aalto et al. or Stafford et al., there is still no role for emotional representations, however, their use of different outcome measures than this research may partly explain these findings. It should be noted that Juergens et al. used only CABG patients while this research used a combination of CABG and PTCA.

Looking in particular at the results from chapter 10, where initial QoL was controlled for at later time points, it is clear that baseline QoL is the major predictor of QoL at later time points. For all domains of QoL at all post-surgery time points, initial QoL predicts the greatest amount of variance in later QoL; in fact, at the immediate post-surgery time point pre-surgery QoL is the only significant predictor of QoL in the regression analysis. This emphasises the importance of finding the factors which influence pre-surgery QoL in preventing poor QoL post-surgery. Referring back to table 10.11, there are a number of IP and coping variables that predict pre-surgery QoL, and three that predict all domains of QoL – consequences, emotional representations and palliative coping. The importance of emotional representations may be related to the probable overlap between this measure and aspects of QoL (particularly emotional QoL), and the fact that this variable is not significant in the final model for each QoL domain indicates it may be driven by other variables or factors.

One possible outside factor is the level of psychological distress experienced by the patient. However it was not possible to measure distress specifically as the NHS ethics board felt that, as the cardiac rehabilitation teams measured anxiety and depression at the start and end of the programme using the HADS (Zigmond & Snaith, 1983), it would be unreasonable to also assess psychological distress as part of the questionnaire packs for this research study. Unfortunately, as the HADS data were collected post-surgery only it would not allow pre-surgery distress to be assessed. In fact, the HADS data were not always collected and recorded routinely as part of the rehabilitation process by the rehabilitation team workers so any direct effects of anxiety and depression on QoL, or interaction with the IP or coping variables. In particular, the role of depression may be important as the negative cognitions and feelings of learned helplessness often experienced in depressed individuals may influence perceptions of illness consequences and lead individuals to employ palliative coping, these two variables being the other predictors of all domains of pre-surgery QoL. Interestingly, though, neither personal nor treatment control were predictors of QoL, and control beliefs would also have been expected to be affected by such depressive thoughts. Looking back at the initial correlations there were significant correlations between personal control and QoL, though these were of a relatively weak effect size, and were not significant once the Bonferroni correction for multiple comparisons was applied. This indicates that there may be a possible role for depression as a driver for QoL but further research would be needed to clarify this.

Factors other than depression pre-surgery may also affect baseline QoL. A recent study by Dempster, Carney and McClements (2010) looked at response shift in QoL from the start to completion of cardiac rehabilitation and found a significant decrease in QoL when rated retrospectively compared at reported at baseline. In other words, the participants felt that, in retrospect, when they reflected on it ten weeks later, their QoL was lower than they reported initially. This may also have been a factor with the participants in the present study, as a number of them stated post-rehabilitation that the effect their cardiac problems had on them and the consequent QoL they felt pre-surgery was worse than they had thought at the time. They attributed this difference to the fact that, due to the gradual decline in their health caused by their cardiac condition, they had made adaptations to their life to ‘cope’ with the impact their illness had on their day to day functioning. They did not realise the extent of these changes until they had recovered from their surgery and were able to return to many activities they had not participated fully in for some time. This indicates that even those with reasonable self-reported QoL pre-surgery may actually be suffering from a poorer QoL and more severe consequences than they realise. Therefore, when looking to identify those at risk a wider range may be needed when labelling individuals as having a poor QoL.

13.3 Prediction of attendance at cardiac rehabilitation

This part of the thesis related to the third hypothesis, which stated that those who attended cardiac rehabilitation would have a greater perception of both personal control over the cardiac condition and of the effectiveness of treatment (treatment control), have perceived more severe consequences of the cardiac problems and would attribute their cardiac problems to behavioural risk factors prior to starting rehabilitation than non-attenders. The findings in chapter 12 did not support this hypothesis either when comparing attenders and non-attenders, where no significant differences in IP or coping variables either pre or post-surgery were found; or when predicting the number of rehabilitation sessions attended. With respect to the number of sessions attended, two significant associations were found. Firstly, having less severe consequences beliefs pre-surgery predicted greater attendance, but this was in the opposite direction to the hypothesis above; secondly, a perception of having better understanding of the cardiac condition pre-rehabilitation predicted attendance at rehabilitation. This was not part of the hypothesis but does tally with the findings from French, Cooper & Weinman’s (2006) review of predictors of attendance at rehabilitation by MI patients. They also found that more symptoms, a greater sense of cure/control and more severe consequences predicted attendance which was not the case here.

The findings from this thesis also contrast with some other findings. Petrie et al. (1996), whose sample only included post-MI patients, found that a stronger belief in cure/control over the cardiac condition (using the IPQ) predicted attendance at least one session of rehabilitation; Cooper et al. (1999) also found that control beliefs predicted attendance, as did having more severe beliefs about the consequences of the condition, and a belief that the condition was caused by lifestyle factors prior to MI or cardiac surgery.

Yohannes et al. (2007) looked at predictors of drop out after no more than one session was attended, and found that drop out was predicted by lower consequences beliefs, higher patient control and greater treatment control. Whitmarsh et al. (2003) looked at the effect of IPs and coping on attendance at rehabilitation after MI and found that poor or non-attendance (less than 50% attendance) was associated with fewer symptoms, a lesser sense of control, a more frequent use of maladaptive coping, and a less frequent use of problem-focussed coping; while better attendance (more than 50% attendance) was predicted by more symptoms, greater perceived consequences, using emotion and problem-focussed coping more frequently, and showing more distress (as measured by HADS).

It is possible that these differences in findings may be affected by a number of methodological differences. Firstly, other studies recruited patients at a variety of stages, with some recruited while still in hospital and some as they started rehabilitation, whereas patients in the present study were elective surgery patients recruited mainly pre-hospital admission. This may well have led to differences in the IP findings. Secondly, there is a wide variation in how attendance at cardiac rehabilitation is defined. The present research defined attendance as attending at least one session, as did Petrie et al., but others required a greater proportion of sessions for individuals to be classified as attenders. Finally, the different composition of the patient groups may have affected the findings, with other studies looking at predominantly or solely MI groups. In addition, in the present study the participants had established CHD which had led to their planned CABG or PTCA so they may well have attended rehabilitation before which may have affected both their motivation to attend once more and their IPs – Michie et al. (2005) found that attending rehabilitation led to an increase in the perception of personal control and reduced anxiety and depression. It should also be noted that attendance at cardiac rehabilitation can be affected by a number of other considerations such as age, deprivation, and doctor recommendation (Cooper, Jackson, Weinman & Horne, 2002).

13.4 Prediction of lifestyle change

The final hypothesis was that pre and post-surgery IP and coping variables would predict lifestyle change, and because of lack of variance in the other life style change data, the analyses presented here concentrated on alcohol use dietary changes. The specific hypothesis was that those making positive lifestyle changes would demonstrate greater beliefs in treatment control, more severe consequences, attribute their cardiac problems to their own behaviour, and have more negative emotional representations. This was examined only for alcohol consumption and choice of spread as all other diet and smoking variables did not significantly change from pre-rehabilitation to one-year follow-up. It should be noted that for both the alcohol and spread variables the significant differences seen in the study population were in the unhealthier direction over time, that is, on the whole, the behaviour of the participants moved to consume more alcohol or use more unhealthy spreads. There were no associations between IP or coping and spread choice but for alcohol change from pre-rehabilitation to one-year post-discharge those whose alcohol consumption increased saw their condition as more episodic prior to surgery.

It is difficult to relate these findings to other findings in the literature due to the nature of the behaviours observed, as previous studies have not looked at different aspects of dietary change, and even alcohol consumption has sometimes been combined with other behaviours to provide a single lifestyle score (e.g. Darr et al, 2008; Stafford et al., 2008). One study that did look at alcohol use separately found that increased alcohol consumption was predicted by less negative emotional representations and a greater belief in one's own behaviour as a cause (reference).

It is possible that, given the multiple tests carried out, any significant findings in the present research with respect to lifestyle change were due to chance. Alternatively, the lack of significant findings may be due to the nature of the behaviours chosen. Diet is generally looked at in terms of fat consumption or the effects of poor diet such as obesity. In addition, much of the previous research has focused on exercise. Most cardiac rehabilitation programmes are run so that each session comprises education/information giving and exercise components, thus supporting the choice of exercise as an outcome variable in previous research. It is possible for patients to attend only the exercise sessions; and therefore not to have received any dietary advice. Additionally, many cardiac rehabilitation courses run as a rolling programme, so patients who do not complete an entire cycle may miss out on dietary advice. In the present study, due to the paucity of the records kept by the rehabilitation teams, it was not possible to determine which session's patients had attended or to control for attendance at specific sessions in any analysis.

13.5 Methodological issues

It should be acknowledged that there are a number of methodological issues that may have affected the findings of this research. Firstly, there were low participant numbers in general. The Countess of Chester hospital estimated that there would be 225 patients a year referred for cardiac surgery; however the actual number was less than half of this. The fact that not all participants then fully completed their questionnaires or all time points of the assessment then led to even smaller numbers in the analyses. It should be noted though that the most similar research to this (Juergens et al., 2010) also had a sample of less than 60. While the Juergens study minimised the effects of high collinearity between the subscales of the IPQ-R by using a summed single measure of IPs in the hierarchical regressions the present study did not do this. However, there was no evidence of collinearity being an effect in the regressions carried out in this study. In addition, a Bonferroni correction was applied on the correlations prior to variables being selected for regressions analyses, hence minimising the chance of type I errors, though possibly increasing the chance of type II errors, which may explain some of the lack of similarity of findings with previous research.

This non-completion of measures may have been linked to the length of the questionnaire pack, some 20 pages. If the research had been initiated later the Brief IPQ might have been used as an alternative (Broadbent et al., 2006), but it was not a well-established measure at the time. The use of this single page measure would have reduced the length of the questionnaire considerably and may have boosted the number of fully completed questionnaires at all stages.

Despite the long length of the questionnaire there are areas that were not fully explored by the current research. As discussed in section 13.2, psychological distress could not be assessed, but in addition severity of cardiac condition was rated using only a doctor generated measure (CCS). This is a common approach, for example, Juergans et al. also rated severity using only doctor generated assessments. However, this does not allow for differentiation between participants in terms of actual pain experienced during an angina attack and frequency of angina attacks, which may well affect their psychological distress and QoL (Arnold et al., 2009; Ashburn & Rice, 1998). While Juergans et al. did measure pain pre and post-CABG they used this only as a predictor of disability, and did not relate this to QoL. This indicates that such considerations are an area that needs further consideration in the future.

There has also been research that has suggested that the IPQ cognitive representations may factor into different dimensions for cardiac surgery patients (Hirani, Pugsley & Newman, 2006). They found a four dimension solution rather than the usual five. These were ‘illness impact’, ‘duration’, ‘control’ and ‘self-image’. Unfortunately, the present sample was not large enough to replicate this analysis. However, it may be the case that self-image, which was not measured here, would be an important predictor of post-surgery quality of life.

It should also be considered that the emotional representations that appear to play such a major role in this research may be interacting with the cognitive representations. For example, poor control may be associated with more negative emotional representations, which in turn are associated with poorer QoL. The nature of the analysis used in this research does not allow that to be assessed and this is an area that could be explored further.

In terms of the lack of significant findings for behavioural change this may have been due to the behaviours examined as detailed earlier, but there are also other methodological issues. Firstly, as these patients all had established CHD many of them may have attended rehabilitation previously so their decisions on attendance or behavioural change may not have been affected by the rehabilitation programme on offer after their surgery. In addition, there were some comments on the forms sent back by the participants about their rehabilitation attendance that suggested that they found the social side of the programme more relevant than the exercise or educational components. Therefore, they may have not taken on board the suggested dietary changes. On the other hand, there may have been gains in terms of emotion regulation from the social support aspect of the rehabilitation classes; participants might have felt better about their cardiac problems as a result of attending classes where they met other patients with similar difficulties, and they might also have been able to provide support for each other.

There were also a number of changes in the delivery of the dietary advice by the Chester rehabilitation programme. Initially, this part of the programme was delivered by the physiologists using generic advice from the British Heart Foundation, but they then took on a trainee dietician and later a fully qualified dietician to provide the relevant information leading to changes in the advice given. Some participants commented that they had found that they could eat foods that they had denied themselves prior to rehabilitation.

13.6 Implications of findings from this study for the application of the CSM to cardiac surgery patients

One of the motivations for the initiation of the present research in January 2003, was the idea that the CSM had not been tested thoroughly in a specifically cardiac surgery population. Much of the research prior to that date (January 2003) had concentrated on MI patients, and had examined cognitive representations and their associated coping strategies of attending rehabilitation or changing lifestyle behaviours, but had not measured emotional representations in relation to quality of life. The present research suggests that emotional responses to cardiac problems and emotion-focussed coping strategies (such as palliative coping and emotional preoccupation coping) may be important predictors of quality of life post cardiac surgery. This is a novel finding, and more recent research with post-cardiac surgery patients, by Juergens et al. (2010), neither confirms nor refutes the present findings, as these authors used a different, non-cardiac specific, measure of QoL and used a summed score for IPs to predict QoL. Therefore there is a need for further research to replicate the present findings. It is unfortunate that data on anxiety and depression via HADS scores, were not made available to the author, and the author was not allowed to include these measures in her study. It is not possible to ascertain whether the population of the present study suffered similar levels of emotional problems as that seen in previous research populations.

These research findings underline the dynamic nature of the CSM, as different associations between illness perceptions and outcome were found at the different time points; additionally findings from cross-sectional and longitudinal analyses differed subtly. The present findings are in accord with previous research showing that coping strategies used change from pre to post-surgery (Crumlish, 1994); on the other hand the degree of consistency across time points for some coping variables does provide some evidence that the individuals do have a preferred coping style.

It has been suggested that the CSM can be used to develop psychological support for patients undergoing cardiac rehabilitation (Lau-Walker, 2007), and as such it should provide an effective framework for predicting QoL, but also for predicting positive outcomes of rehabilitation such as behavioural change. However, the lack of expected associations between cognitive representations of cardiac problems, behavioural change and rehabilitation attendance, raises questions about the value of these CSM constructs in this population.

13.7 Implications for practice

The implications for practice from this research cross the fields of both cardiac surgery services and cardiac rehabilitation. The primary implication of this research for cardiac surgery is to underline the importance of attending to patients' emotional responses to their cardiac problems. Others have found that pre-surgery psychological distress in CABG patients predicts post-surgery distress up to 12 months later (Grossi, Perski, Feleke & Jakobson, 1998; Panagopoulou, Montgomery & Benos, 2006; McKenzie, Simpson & Stewart, 2010). The findings in the longitudinal analysis reported in chapter 10 concur with this, as it was found that the best predictor of QoL at all post-surgery time points was initial QoL. This therefore suggests that cardiac specialists working with these patients should be looking to identify those at risk at this early stage. In addition, the relationship between IPs and coping variables with current QoL cross-sectionally at all time points indicates that the IP and coping measures may also be useful to indicate those at risk at all stages.

Within this research the fact that consequences, emotional representations and use of related coping strategies predicted QoL prior to surgery which in turn predicts long term QoL might enable us to identify those at risk of a poor outcome prior to surgery using the CSM and hence develop an emotion-regulation intervention, teaching patients more effective coping strategies to regulate their emotions. This has successfully been done to change cognitive IPs of those who had just had an MI (Petrie, Cameron, Ellis, Buick & Weinman, 2002).

In practical service delivery terms, this would involve assessing individuals at their pre-surgical appointments and identifying those at risk, and then providing them with an emotion-regulation intervention to reduce their negative emotional representations and alter their preferred coping strategies. Due to the dynamic nature of the CSM this may also involve helping individuals to develop more adaptive cognitive representations as these may be contributing to their poor emotional representations.

Turning to implications for cardiac rehabilitation practice, these relate to the adherence to service guidelines in terms of record keeping and the individualisation of service provision. Recommendations for cardiac rehabilitation service delivery for the two rehabilitation services involved in this research come from the English and Welsh National Service Frameworks (NSFs) for Coronary Heart Disease, and the standards and core components for cardiac rehabilitation put forward by the British Association for Cardiac Rehabilitation (BACR, 2007). These indicate a need for a varied and individualised programme, incorporating exercise; education on lifestyle and vocational adjustments; and psychosocial support if needed. Both the Chester and Wrexham services provide a group programme delivered once a week. This is split in both cases into part exercise and part educational session, with the educational component covering recommended lifestyle changes, risk factor management and understanding drug treatments. For both services this level of delivery is less than the three sessions per week described as typical by the BACR. Due to the group delivery of this educational component this also does not allow for personalisation to the individual; although personalisation of the exercise component is possible. Both programmes also use a rolling delivery; while this means that patients can miss a session due to a prior appointment or illness and still attend the total number of sessions by ‘adding’ weeks on to the end, this does mean that certain educational topics may be repeated or missed completely.

Aspects of the cardiac rehabilitation programme should be aimed not just at the patient, but at their spouse or carer as well, for example when explaining risk factors, lifestyle adjustment or recommending training in cardiopulmonary resuscitation. While there is some possibility of this at the initial appointment with the Wrexham service which is carried out at the patient’s residence, at no time is there any organised contact with anyone other than the patient him or herself at the Chester programme. This means that the importance of, or detail of, any changes that should be made to the patient’s lifestyle may not be fully grasped by their spouse or carer, which may have implications for their morbidity or mortality in the future.

There are also serious issues with the accuracy of record keeping and what data is collected by the two services. Wrexham keeps full copies of their own rehabilitation data while at Chester this is added to the general patient records. During the course of this research Chester shifted to electronic record keeping but the bulk of the information gathered was in a paper format. Some of these paper records were missing from the patient records when they were accessed by the researcher, even though there was evidence that the information had been present at some point as other content referred to this information. Attendance at both services was monitored by a register taken at the start of each session, however both programmes started with the exercise component and if a patient then chose not to stay for the educational component (which some patients admitted to on the questionnaire on rehabilitation attendance sent out by the researcher) this was not noted. For the written records at Chester the topic of the educational component each week was not always noted and could not always be cross-referenced against the records of other participants in this research.

In terms of the psychological data collected, a HADS questionnaire was given out at the initial appointment at cardiac rehabilitation by both services, however for the Chester service this information was not always recorded, nor did the staff always remember to repeat this at the end of rehabilitation. Both services did not have ready access to psychology services or a cognitive behavioural therapist for those whose scores on the HAD indicated a clinical need, with the Chester programme referring individuals to a liaison psychiatrist, and the Wrexham service advising the affected patients to ask their GP for a referral for therapy. Neither service collected data on QoL.

Overall, this implies a need for emphasising the importance of more thorough record-keeping, particularly for the Chester service. Both services also need to ensure that attendance is monitored for both the exercise and educational aspects, and that safeguards are put in place to prevent certain educational content being missed if patients do not complete the programme in an uninterrupted block. There is also a need to revise the delivery of the educational components of both services to check that not only are they covering all the areas recommended but also personalising these to the individual needs of the patients referred to them. They also need to negotiate better psychological support for their patients suffering psychological distress. Further involvement with psychological services in general service delivery at a direct or advisory level would also ensure that both programmes fully encompass educational, psychological and exercise components as recommended within the NSFs. This would also mean that further data on the psychological status of those attending rehabilitation would be collected.

At a regional level, it would be beneficial for the Cardiothoracic Centre to audit what the patients they operate on are receiving in terms of cardiac rehabilitation, especially as differences here could lead to variations in mortality and morbidity which may affect the long term data collected by the hospital. The Cardiothoracic hospital provides an interview with a cardiac rehabilitation nurse, supported by documentation provided by the British Heart Foundation, and faxes a referral direct to the relevant cardiac rehabilitation programme. However, this may not ensure that patients then go on to attend the rehabilitation service, so work on motivating patients to attend could be carried out by the rehabilitation nurse after training from a relevant professional such as a Health Psychologist.

At a national level there is a need for the audit information collected by the BACR to be expanded to ensure that all recommended core components of a rehabilitation programme are delivered. More detailed recommendations on the various professionals that should deliver or give input to the make-up of a programme should also be made by the BACR, for example recommending guidance from a Health Psychologist. This would ensure that all recommended aspects of cardiac rehabilitation are covered equally as recommended (NHS Centre for Reviews and Dissemination, 1998), rather than an emphasis being made on the importance of the exercise component.

13.8 Final conclusions

This research suggests that there may be differences in patterns of associations between illness perceptions and illness outcomes between planned cardiac surgery patients, the population group studied here, and other cardiac groups, such as post-MI patients. Several previous research studies have combined elective surgery, emergency surgery, angina and MI samples, and the present research suggests that these sub samples should be considered separately. Secondly, the research underlines the importance of emotional representations of illness and the associated strategies for coping with emotions. Further research to replicate the findings of the present research might help us to identify individuals at risk prior to surgery, with a view to developing an emotion-regulation intervention to improve the outcome for these individuals. Finally, there is a need to work with cardiac rehabilitation programmes at both local and national levels to ensure that guidelines for the delivery of rehabilitation are adhered to, and that psychological input is part of all programmes whether at a direct or advisory level.

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APPENDIX A

Ethical permissions

Cheshire West NHS
Primary Care Trust

SOUTH CHESHIRE LOCAL RESEARCH ETHICS COMMITTEES
Comprising three committees - Chester, Crewe and Macclesfield

1 July 2003

Ms Elizabeth Whelen
Department of Psychology
Chester College of Higher Education
Parkgate Road
Chester CH1 4BJ

Dear Ms Whelen,

Application Number: C297/03
Title: Patient's perceptions of changes in their quality of life after coronary artery bypass grafting surgery and cardiac rehabilitation.

Thank you for your letter received on 13th June, 2003, supplying amendments as requested by Chester LREC at the meeting held on Wednesday 7th May 2003. The Chairman, acting under delegated authority, is satisfied that all the points raised have been addressed. There is therefore no objection on ethical grounds to the above named study. This study is **Approved**.

Conditions of Approval

- Any amendments to the study must be approved by this committee
- The study must start within three years of the date of this letter
- Any serious unexpected adverse reactions must be notified to the committee
- You complete the interim report form sent to you at the end of each year
- You complete a final report at the end of the study

The following items were reviewed in connection with the above study.

Ability of Investigator and staff to perform the proposed research	Approved
Suitability of the premises and facilities	Approved
Protocol	Approved revised protocol
Protocol Amendments	N/A
Methods of Initial Recruitment to Study	Approved
Compensation for Investigator's Participation	N/A

continued.....

The Cardiothoracic Centre - Liverpool NHS
NHS Trust

Thomas Drive
Liverpool
L14 3PE

Tel: 0151 228 1616
Fax: 0151 220 8573
Website: www.ctc.nhs.uk

Department of Research, Development & Clinical Audit
Dept. Tel: 0151 293 2370
Dept. Fax: 0151 288 2371

Monday 14 July 2003

Dear , liz

Re: Patient Perceptions of Changes in their Quality of Life after Coronary Artery Bypass Grafting and Cardiac Rehabilitation

The above application was reviewed by the Academic Committee at its May 2003 meeting. I am pleased to inform you that the Committee found no objection to the above study. The proposal was also reviewed by the Service Users Research Awareness Group, who act as a lay review panel, they found no objections to the study and give their approval accordingly.

Good luck with your research.

Yours sincerely,

Alison

Lin Nelson
Research, Audit and Effectiveness Coordinator

Dr T P C Stibbs
Secretary to the Ethics Committee
Tel: 0161 275 2046
Fax: 0161 275 5697

ref: TPCS/JSS/ethics/03113

THE UNIVERSITY
of MANCHESTER

21 July 2003

Ms Elizabeth Whelen
Department of Psychology
Chester College of Higher Education
Parkgate Road
Chester CH1 4BJ

Dear Ms Whelen

Committee on the Ethics of Research on Human Beings

03113 Patients' perceptions of changes in their quality of life (QoL) after coronary artery bypass grafting (CABG) surgery and cardiac rehabilitation (South Cheshire ref C297/03)

This is just to confirm that I have received all the papers for the above project and that there is no ethical impediment to it proceeding. It will be formally reported to the Senate Committee at its next meeting on 9th October 2003.

I hope that the project goes well.

Yours sincerely,

Mrs Jayne Smith-Saville
Secretary to Dr T Stibbs

APPENDIX B

Participant information letter and consent form

Date

Dear {patient's name}

An invitation to take part in some research for the cardiac rehabilitation programme

We are writing to you as someone who is on the waiting list for coronary artery bypass grafting surgery or percutaneous transluminal coronary angioplasty (otherwise known as stenting). As you may already know, after having this surgery you will be offered a place on the Cardiac Rehabilitation programme offered by the {Hospital name}. The programme you will be invited to attend is specially designed for people who have had your type of surgery, and aims to aid your recovery.

In order to make sure that this programme is as helpful as possible we would like you to agree to take part in some research for us. We would like to ask you some questions before you have your surgery, at the beginning and end of the Cardiac Rehabilitation Programme, and one year after you have the surgery. This will help us to see if having the surgery and attending the Rehabilitation Programme has improved your quality of life. Full details of the research are given in the attached information sheet. Please take time to read the attached information carefully and discuss it with others if you wish. Do take as much time as you need to decide whether or not you wish to take part. Taking part in this research is completely voluntary, and if you choose not to take part it will not affect your treatment.

If you are willing to take part in the research please return your completed consent forms (enclosed). One of these will be returned to you for your records. If you would like further information on exactly what taking part in the research would involve, or you have any queries about the information in the information sheet, please contact Liz Whelen at the Department of Psychology, University of Chester, Parkgate Road, Chester, CH1 4BJ. You can also telephone her on 01244 513226, an answer phone is available 24 hours a day. You may also email Liz Whelen on ewhelen@chester.ac.uk. Thank you for taking time to read the attached information.

Yours sincerely,

Liz Whelen
Lead Researcher

Patient identification number …………..

CONSENT FORM

Title of project: **Patient perceptions of changes in their quality of life due to Coronary Artery Bypass Surgery (CABG) or percutaneous transluminal coronary angioplasty (PTCA) and cardiac rehabilitation**

Name of Researcher: **Liz Whelen**

Please initial box

1. I confirm that I have read and understood the information sheet dated …….. for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐
3. I understand that sections of my medical notes may be looked at by the researcher (Liz Whelen), where it is relevant to my taking part in the research. I give permission for this individual to have access to my records. ☐
4. I agree to take part in the above study. ☐

Name of Patient ______________________ Date __________ Signature ______________________

Name of person taking consent ______________________ Date __________ Signature ______________________
(if different from researcher)

Researcher ______________________ Date __________ Signature ______________________
1 for patient; 1 for researcher; 1 to be kept with hospital notes

APPENDIX C

Patient Information Sheets

Patient information sheet

Patient perceptions of changes in their quality of life due to coronary artery bypass grafting surgery (CABG) or percutaneous transluminal coronary angioplasty (PTCA) and cardiac rehabilitation

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.
Thank you for reading this.

The purpose of the study

As well as improving your physical health coronary artery bypass surgery or coronary angioplasty is also intended to improve your quality of life. By quality of life we mean how your condition affects your physical health, as well as how it affects you emotionally and how it might affect your social activities. This study aims to look at how patients' quality of life changes after undergoing coronary artery bypass surgery or coronary angioplasty and attendance at the {Hospital name} hospital's cardiac rehabilitation programme. The study also intends to look at how patients' beliefs about their condition might affect their quality of life. These beliefs include how people identified their condition initially, what they think the causes of the condition are, what consequences it has for them, and what control they think they have over their condition. To help us to see how patients live with their condition, they will also be asked about what methods they use to cope with it. By looking at these three things, quality of life, illness beliefs and coping, the study hopes to see if patients' quality of life improves after their surgery, and if this is a long term improvement. It will also allow us to see how much improvement is due to the new cardiac rehabilitation programme at the {Hospital name} hospital. In order for us to be able to be able to assess this we will be asking all patients undergoing coronary artery bypass surgery or coronary angioplasty for a two year period to take part in this research, following them for up to one year after their surgery.

Why have I been chosen?

You have been chosen to take part in this study as someone scheduled to undergo coronary artery bypass surgery or coronary angioplasty during this two year period. We estimate that there will be a total of 300 patients invited to take part in this research study, which involves filling in a set of questionnaires at four different time points.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form (you will also be given a copy of this form). If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive. You can also choose not to answer specific questions.

What will happen to me if I decide to take part?

If you agree to take part in the research you will have to complete a set of questionnaires at four different time points. These questionnaires assess your quality of life, your illness beliefs and how you cope with your condition. They will be given to you either in person or posted to you before you have surgery, before you start the cardiac rehabilitation programme, at the end of the programme, and one year after you had your surgery. You will be given a stamped addressed envelope to return the questionnaires, or you may return them directly to the researcher. Each set of questionnaires should take between 20 and 60 minutes to complete, as the content of the questionnaires varies a little at each of the four stages. We would like you to take part whether or not you intend to go to, or complete, the cardiac rehabilitation programme, as we would like to see what affect attending this programme has on your quality of life, your illness beliefs and how you cope with your condition.

If you do decide to take part we would like you to intend to take part for the full year of the study, but you are still free to withdraw from the study at any time. What you would have to do if you agree to take part is shown below.

Initial set of questionnaires
↓
Surgery
↓
Second set of questionnaires
↓
Cardiac rehabilitation programme
↓
Third set of questionnaires
↓
1 year after surgery: Fourth set of questionnaires

What are the possible benefits of taking part?
There are no direct benefits to you from taking part in this study. However, the information we get from this study may help us to improve treatment for future patients undergoing coronary artery bypass surgery or coronary angioplasty, and attending a cardiac rehabilitation programme.

Will taking part in this study be kept confidential?
All information that is collected about you during the course of this research will be kept strictly confidential. Any information about you that leaves the hospital will have your name and address removed so that you cannot be recognised from it.

What will happen to the results of the research study?
The results of this study will be supplied to the Cardiology department at the {hospital name} and the Cardiothoracic Centre in the spring of 2007. You may obtain a copy of these results by contacting the researcher named below after the 31st March 2007. The results may also be published in academic journals, again you may ask for copies of these publications. Unfortunately, we are unable to give specific dates for these publications, but if you wish to have copies you can ask us to send them to you when they are available. No one who takes part in the research will be identified in any way in any publications.

Who is organising this research?
This research is being carried out by the University of Manchester and University of Chester, together with the Cardiac Rehabilitation Unit at the {Hospital name} and the Cardiothoracic Centre. No health service worker or researcher is being paid for including you in this study.

Contact for Further Information.
If you wish further information at any time you can contact the lead researcher Liz Whelen at the Department of Psychology, University of Chester, Parkgate Road, Chester, CH1 4BJ. You can also telephone her on 01244 513226, an answer phone is available 24 hours a day. You may also email Liz Whelen on ewhelen@chester.ac.uk.

Thank you for agreeing to take part in this study.

{date month, year}

Patient information sheet

Patient perceptions of changes in their quality of life due to coronary artery bypass grafting surgery (CABG) or percutaneous transluminal coronary angioplasty (PTCA) and cardiac rehabilitation

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.
Thank you for reading this.

The purpose of the study

As well as improving your physical health coronary artery bypass surgery or coronary angioplasty is also intended to improve your quality of life. By quality of life we mean how your condition affects your physical health, as well as how it affects you emotionally and how it might affect your social activities. This study aims to look at how patients’ quality of life changes after undergoing coronary artery bypass surgery or coronary angioplasty and attendance at the {Hospital name} hospital’s cardiac rehabilitation programme. The study also intends to look at how patients’ beliefs about their condition might affect their quality of life. These beliefs include how people identified their condition initially, what they think the causes of the condition are, what consequences it has for them, and what control they think they have over their condition. To help us to see how patients live with their condition, they will also be asked about what methods they use to cope with it. By looking at these three things, quality of life, illness beliefs and coping, the study hopes to see if patients’ quality of life improves after their surgery, and if this is a long term improvement. It will also allow us to see how much improvement is due to the new cardiac rehabilitation programme at the {Hospital name} hospital. In order for us to be able to be able to assess this we will be asking all patients undergoing coronary artery bypass surgery or coronary angioplasty for a two year period to take part in this research, following them for up to one year after their surgery.

Why have I been chosen?

You have been chosen to take part in this study as someone scheduled to undergo coronary artery bypass surgery or coronary angioplasty during this two year period. We estimate that there will be a total of 300 patients invited to take part in this research study, which involves filling in a set of questionnaires at four different time points. We are also asking one in every five patients, at random, to agree to be interviewed as well at each of these time points. You are one of the patients we would like to ask to be interviewed.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form (you will also be given a copy of this form). If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive. If you do not want to be interviewed, or decide after doing one or more interviews that you do not want to be interviewed again, but are happy to answer the questionnaires, then you can decline to take part in the interview part of the research study and only fill in the questionnaires. You can also choose not to answer specific questions.

What will happen to me if I decide to take part?

If you agree to take part in the research you will have to complete a set of questionnaires at four different time points. These questionnaires assess your quality of life, your illness beliefs and how you cope with your condition. They will be given to you either in person or posted to you before you have surgery, before you start the cardiac rehabilitation programme, at the end of the programme, and one year after you had your surgery. You will be given a stamped addressed envelope to return the questionnaires, or you may return them directly to the researcher. Each set of questionnaires should take between 20 and 60 minutes to complete, as the content of the questionnaires varies a little at each of the four stages. We would like you to take part whether or not you intend to go to, or complete, the cardiac rehabilitation programme, as we would like to see what affect attending this programme has on your quality of life, your illness beliefs and how you cope with your condition.

As somebody who has also been selected to take part in the interviews we would also like to interview you at these same time points – before surgery, at the beginning and end of the cardiac rehabilitation programme, and one year after your surgery. These interviews will ask you about your quality of life, your illness beliefs and how you cope with your condition in more detail. This will allow us to see how these are affected in more depth than is possible with the questionnaires. Each of these interviews should take up to an hour, and can be carried out in a place of your choice. We would like to record these interviews to make sure we do not miss any of the things you tell us; we would send you a written copy of this to make sure you are quoted correctly. If you do not want to be recorded we will respect this decision, and will take only written notes. Again you would be sent a copy of these.

If you do decide to take part we would like you to intend to take part for the full year of the study, but you are still free to withdraw from the study at any time. What you would have to do if you agree to take part is shown overleaf.

Initial set of questionnaires and first interview
↓
Surgery
↓
Second set of questionnaires and second interview
↓
Cardiac rehabilitation programme
↓
Third set of questionnaires and third interview
↓
1 year after surgery: Fourth set of questionnaires and final interview

What are the possible benefits of taking part?

There are no direct benefits to you from taking part in this study. However, the information we get from this study may help us to improve treatment for future patients undergoing coronary artery bypass surgery or coronary angioplasty, and attending a cardiac rehabilitation programme.

Will taking part in this study be kept confidential?

All information that is collected about you during the course of this research will be kept strictly confidential. Any information about you that leaves the hospital will have your name and address removed so that you cannot be recognised from it. The tapes of your interviews will be securely stored and destroyed at the end of the study.

What will happen to the results of the research study?

The results of this study will be supplied to the Cardiology department at the {Hospital name} and the Cardiothoracic Centre in the spring of 2007. You may obtain a copy of these results by contacting the researcher named below after the 31st March 2007. The results may also be published in academic journals, again you may ask for copies of these publications.

Unfortunately, we are unable to give specific dates for these publications, but if you wish to have copies you can ask us to send them to you when they are available. No one who takes part in the research will be identified in any way in any publications.

Who is organising this research?

This research is being carried out by the University of Manchester and University of Chester, together with the Cardiac Rehabilitation Unit at the {Hospital name}l and the Cardiothoracic Centre. No health service worker or researcher is being paid for including you in this study.

Contact for Further Information.

If you wish further information at any time you can contact the lead researcher Liz Whelen at the Department of Psychology, University of Chester, Parkgate Road, Chester, CH1 4BJ. You can also telephone her on 01244 513226, an answer phone is available 24 hours a day. You may also email Liz Whelen on ewhelen@chester.ac.uk.

Thank you for agreeing to take part in this study.

{date, month year}

APPENDIX D

Pre-surgery Questionnaire

Coronary Artery Bypass Patients Background Questions

All the questions we would like you to answer are to do with your cardiac problems that have led to you requiring a bypass operation. Initially we would like some basic information on your cardiac history, your social situation, and your diet.

For questions 1 and 8 please fill in the number of years and months (e.g. 03 Years 09 Months).
For questions 2, 4 5 and 6 please write your answers in the boxes below each question.
For all the other questions please tick all the boxes that apply to you.

1 How long have you had your cardiac problems?

☐☐ years ☐☐ months

---

2 What did you first notice?

---

3 Have you had previous cardiac surgery?

Yes (please tick all that apply) ☐ ☐ No

☐ 1 previous coronary artery bypass ☐ more than 1 previous bypass ☐ other cardiac surgery

---

4 Who do you live with?

---

5 Are any of the people mentioned in the question above dependent on you financially?

6 Are any of the people mentioned in question 4 dependent on you for their day to day care?

---

7 Do you currently work?

☐ Yes, go to question 9
☐ Retired
☐ Not working at the moment, due to cardiac problems
☐ Unemployed at the moment

8 How long is it since you last worked?

☐☐ years ☐☐ months

9 Do you intend to return to work? Yes ☐ ☐ No

ILLNESS PERCEPTION QUESTIONNAIRE (IPQ-R)

YOUR VIEWS ABOUT YOUR CARDIAC PROBLEMS

Listed below are a number of symptoms that you may or may not have experienced since your cardiac problems started. Please indicate by ticking Yes or No, whether you have experienced any of these symptoms since your cardiac problems began, and whether you believe that these symptoms are related to your condition.

	I have experienced this symptom since my cardiac problems began		This symptom is related to my cardiac problems	
Pain	Yes ☐	☐ No	Yes ☐	☐ No
Sore Throat	Yes ☐	☐ No	Yes ☐	☐ No
Nausea	Yes ☐	☐ No	Yes ☐	☐ No
Breathlessness	Yes ☐	☐ No	Yes ☐	☐ No
Weight Loss	Yes ☐	☐ No	Yes ☐	☐ No
Fatigue	Yes ☐	☐ No	Yes ☐	☐ No
Stiff Joints	Yes ☐	☐ No	Yes ☐	☐ No
Sore Eyes	Yes ☐	☐ No	Yes ☐	☐ No
Wheeziness	Yes ☐	☐ No	Yes ☐	☐ No
Headaches	Yes ☐	☐ No	Yes ☐	☐ No
Upset Stomach	Yes ☐	☐ No	Yes ☐	☐ No
Sleep Difficulties	Yes ☐	☐ No	Yes ☐	☐ No
Dizziness	Yes ☐	☐ No	Yes ☐	☐ No
Loss of Strength	Yes ☐	☐ No	Yes ☐	☐ No

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

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

VIEWS ABOUT YOUR cardiac problems	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
My cardiac problems will last a short time	☐	☐	☐	☐	☐
My cardiac problems are likely to be permanent rather than temporary	☐	☐	☐	☐	☐
My cardiac problems will last for a long time	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
These cardiac problems will pass quickly	☐	☐	☐	☐	☐
I expect to have these cardiac problems for the rest of my life	☐	☐	☐	☐	☐
My cardiac problems are a serious condition	☐	☐	☐	☐	☐
My cardiac problems have major consequences on my life	☐	☐	☐	☐	☐
My cardiac problems do not have much effect on my life	☐	☐	☐	☐	☐
My cardiac problems strongly affect the way others see me	☐	☐	☐	☐	☐
My cardiac problems have serious financial consequences	☐	☐	☐	☐	☐
My cardiac problems cause difficulties for those who are close to me	☐	☐	☐	☐	☐
There is a lot which I can do to control my symptoms	☐	☐	☐	☐	☐
What I do can determine whether my cardiac problems get better or worse	☐	☐	☐	☐	☐
The course of my cardiac problems depends on me	☐	☐	☐	☐	☐
Nothing I do will affect my cardiac problems	☐	☐	☐	☐	☐
I have the power to influence my cardiac problems	☐	☐	☐	☐	☐
My actions will have no affect on the outcome of my cardiac problems	☐	☐	☐	☐	☐
My cardiac problems will improve in time	☐	☐	☐	☐	☐
There is very little that can be done to improve my cardiac problems	☐	☐	☐	☐	☐
My treatment will be effective in curing my cardiac problems	☐	☐	☐	☐	☐
The negative effects of my cardiac problems can be prevented (avoided) by my treatment	☐	☐	☐	☐	☐
My treatment can control my cardiac problems	☐	☐	☐	☐	☐
There is nothing which can help my condition	☐	☐	☐	☐	☐
The symptoms of my condition are puzzling to me	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
My cardiac problems are a mystery to me	☐	☐	☐	☐	☐
I don't understand my cardiac problems	☐	☐	☐	☐	☐
My cardiac problems don't make any sense to me	☐	☐	☐	☐	☐
I have a clear picture or understanding of my condition	☐	☐	☐	☐	☐
The symptoms of my cardiac problems change a great deal from day to day	☐	☐	☐	☐	☐
My symptoms come and go in cycles	☐	☐	☐	☐	☐
My cardiac problems are very unpredictable	☐	☐	☐	☐	☐
I go through cycles in which my cardiac problems get better and worse.	☐	☐	☐	☐	☐
I get depressed when I think about my cardiac problems	☐	☐	☐	☐	☐
When I think about my cardiac problems I get upset	☐	☐	☐	☐	☐
My cardiac problems make me feel angry	☐	☐	☐	☐	☐
My cardiac problems do not worry me	☐	☐	☐	☐	☐
Having these cardiac problems makes me feel anxious	☐	☐	☐	☐	☐
My cardiac problems make me feel afraid	☐	☐	☐	☐	☐

CAUSES OF MY CARDIAC PROBLEMS

We are interested in what you consider may have been the cause of your cardiac problems. As people are very different, there is no correct answer for this question. We are most interested in your own views about the factors that caused your condition rather than what others including doctors or family may have suggested to you. Below is a list of possible causes for your condition. Please indicate how much you agree or disagree that they were causes for you by ticking the appropriate box.

POSSIBLE CAUSES	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Stress or worry	☐	☐	☐	☐	☐
Hereditary - it runs in my family	☐	☐	☐	☐	☐
A germ or virus	☐	☐	☐	☐	☐
Diet or eating habits	☐	☐	☐	☐	☐
Chance or bad luck	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Poor medical care in my past	☐	☐	☐	☐	☐
Pollution in the environment	☐	☐	☐	☐	☐
My own behaviour	☐	☐	☐	☐	☐
My mental attitude e.g. thinking about life negatively	☐	☐	☐	☐	☐
Family problems or worries caused my cardiac problems	☐	☐	☐	☐	☐
Overwork	☐	☐	☐	☐	☐
My emotional state e.g. feeling down, lonely, anxious, empty	☐	☐	☐	☐	☐
Ageing	☐	☐	☐	☐	☐
Alcohol	☐	☐	☐	☐	☐
Smoking	☐	☐	☐	☐	☐
Accident or injury	☐	☐	☐	☐	☐
My personality	☐	☐	☐	☐	☐
Altered immunity	☐	☐	☐	☐	☐

In the table below, please list in rank-order the three most important factors that you now believe caused YOUR cardiac problems. You may use any of the items from the box above, or you may have additional ideas of your own.

The most important causes for me:-

1

2

3

Coping with Health Injuries and Problems Scale (CHIP)

The following are ways of reacting to health problems, such as cardiac problems, sickness, or injuries. We are interested in your recent cardiac problems. Please tick the box that indicates how much you have engaged in these types of activities when encountering your cardiac problems.

	not at all	rarely	sometimes	often	very much
Think about better times	☐	☐	☐	☐	☐
Stay in bed	☐	☐	☐	☐	☐
Find out more information	☐	☐	☐	☐	☐
Wonder "why me"	☐	☐	☐	☐	☐
Be with others	☐	☐	☐	☐	☐
Rest when tired	☐	☐	☐	☐	☐
Seek treatment quickly	☐	☐	☐	☐	☐
Feel angry	☐	☐	☐	☐	☐
Daydream	☐	☐	☐	☐	☐
Sleep	☐	☐	☐	☐	☐
Focus on getting better	☐	☐	☐	☐	☐
Become frustrated	☐	☐	☐	☐	☐
Enjoy attention from people	☐	☐	☐	☐	☐
Conserve energy	☐	☐	☐	☐	☐
Learn more	☐	☐	☐	☐	☐
Think about things I can't do	☐	☐	☐	☐	☐
Plan for the future	☐	☐	☐	☐	☐
Stay warm	☐	☐	☐	☐	☐
Comply with advice	☐	☐	☐	☐	☐
Fantasise about being healthy	☐	☐	☐	☐	☐
Listen to music	☐	☐	☐	☐	☐
Make surroundings quiet	☐	☐	☐	☐	☐
Follow doctor's advice	☐	☐	☐	☐	☐
Wish it hadn't happened	☐	☐	☐	☐	☐
Invite company	☐	☐	☐	☐	☐
Stay quiet	☐	☐	☐	☐	☐
Take medications on time	☐	☐	☐	☐	☐
Think about being vulnerable	☐	☐	☐	☐	☐
Have nice things around	☐	☐	☐	☐	☐
Get comfortable	☐	☐	☐	☐	☐
Find out about treatments	☐	☐	☐	☐	☐
Worry about my health	☐	☐	☐	☐	☐

MACNEW HEART DISEASE HEALTH-RELATED QUALITY OF LIFE QUESTIONNAIRE

I would now like to ask you some questions about how you have been feeling **DURING THE LAST 2 WEEKS**.

Please check the box ☒ that matches your answer

---

1 **In general, how much of the time during the last 2 weeks have you felt frustrated, impatient or angry?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

2 **How often during the last 2 weeks have you felt worthless or inadequate?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

3 **In the last 2 weeks, how much of the time did you feel very confident and sure that you could deal with your heart problem?**

NONE OF THE TIME ☐
A LITTLE OF THE TIME ☐
SOME OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
MOST OF THE TIME ☐
ALMOST ALL OF THE TIME ☐
ALL OF THE TIME ☐

4 **In general how much of the time did you feel discouraged or down in the dumps during the last 2 weeks?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

5 **How much of the time during the past 2 weeks did you feel relaxed and free of tension?**

NONE OF THE TIME ☐
A LITTLE OF THE TIME ☐
SOME OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
MOST OF THE TIME ☐
ALMOST ALL OF THE TIME ☐
ALL OF THE TIME ☐

---

6 **How often during the last 2 weeks have you felt worn out or low in energy?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

7 **How happy, satisfied, or pleased have you been with your personal life during the last 2 weeks?**

- VERY DISSATISFIED, UNHAPPY MOST OF THE TIME ☐
- GENERALLY DISSATISFIED, UNHAPPY ☐
- SOMEWHAT DISSATISFIED, UNHAPPY ☐
- GENERALLY SATISFIED, PLEASED ☐
- HAPPY MOST OF THE TIME ☐
- VERY HAPPY MOST OF THE TIME ☐
- EXTREMELY HAPPY, COULD NOT HAVE BEEN MORE SATISFIED OR PLEASED ☐

8 **In general, how often during the last 2 weeks have you felt restless, or as if you were having difficulty trying to calm down?**

- ALL OF THE TIME ☐
- MOST OF THE TIME ☐
- A GOOD BIT OF THE TIME ☐
- SOME OF THE TIME ☐
- A LITTLE OF THE TIME ☐
- HARDLY ANY OF THE TIME ☐
- NONE OF THE TIME ☐

9 **How much shortness of breath have you experienced during the last 2 weeks while doing your day-to-day physical activities?**

- EXTREME SHORTNESS OF BREATH ☐
- VERY SHORT OF BREATH ☐
- QUITE A BIT OF SHORTNESS OF BREATH ☐
- MODERATE SHORTNESS OF BREATH ☐
- SOME SHORTNESS OF BREATH ☐
- A LITTLE SHORTNESS OF BREATH ☐
- NO SHORTNESS OF BREATH ☐

10 **How often during the last 2 weeks have you felt tearful, or like crying?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

11 **How often during the last 2 weeks have you felt as if you are more dependent than you were before your heart problem?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

12 **How often during the last 2 weeks have you felt you were unable to do your usual social activities, or social activities with your family?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

13 **How often during the last 2 weeks have you felt as if others no longer have the same confidence in you as they did before your heart problem?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

14 **How often during the last 2 weeks have you experienced chest pain while doing your day-to-day activities?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

15 **How often during the last 2 weeks have you felt unsure of yourself or lacking in self-confidence?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

16 **How often during the last 2 weeks have you been bothered by aching or tired legs?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

17 **During the last 2 weeks, how much have you been limited in doing sports or exercise as a result of your heart problem?**

EXTREMELY LIMITED ☐
VERY LIMITED ☐
LIMITED QUITE A BIT ☐
MODERATELY LIMITED ☐
SOMEWHAT LIMITED ☐
LIMITED A LITTLE ☐
NOT LIMITED AT ALL ☐

---

18 **How often during the last 2 weeks have you felt apprehensive or frightened?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

19 **How often during the last 2 weeks have you felt dizzy or lightheaded?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

20 **In general during the last 2 weeks, how much have you been restricted or limited as a result of your heart problem?**

EXTREMELY LIMITED ☐
VERY LIMITED ☐
LIMITED QUITE A BIT ☐
MODERATELY LIMITED ☐
SOMEWHAT LIMITED ☐
LIMITED A LITTLE ☐
NOT LIMITED AT ALL ☐

21 **How often during the last 2 weeks have you felt unsure as to how much exercise or physical activity you should be doing?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

22 **How often during the last 2 weeks have you felt as if your family is being over-protective toward you?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

23 **How often during the past 2 weeks have you felt as if you were a burden on others?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

24 **How often during the past 2 weeks have you felt excluded from doing things with other people because of your heart problem?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

25 **How often during the past 2 weeks have you felt unable to socialise because of your heart problem?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

26 **In general, during the last 2 weeks how much have you been physically restricted or limited as a result of your heart problem?**

EXTREMELY LIMITED ☐
VERY LIMITED ☐
LIMITED QUITE A BIT ☐
MODERATELY LIMITED ☐
SOMEWHAT LIMITED ☐
LIMITED A LITTLE ☐
NOT LIMITED AT ALL ☐

---

27 **How often during the last 2 weeks have you felt your heart problem limited or interfered with sexual intercourse?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

By placing a tick in one box in each group below, please indicate which statement best describes your own health state today.

Mobility

I have no problems in walking about ☐
I have some problems walking about ☐
I am confined to bed ☐

Self Care

I have no problems with self care ☐
I have some problems washing or dressing myself ☐
I am unable to wash or dress myself ☐

Usual Activities (e.g. work, study, house work, family or leisure activities)

I have no problems with performing my usual activities ☐
I have some problems with performing my usual activities ☐
I am unable to perform my usual activities ☐

Pain / Discomfort

I have no pain or discomfort ☐
I have moderate pain or discomfort ☐
I have extreme pain or discomfort ☐

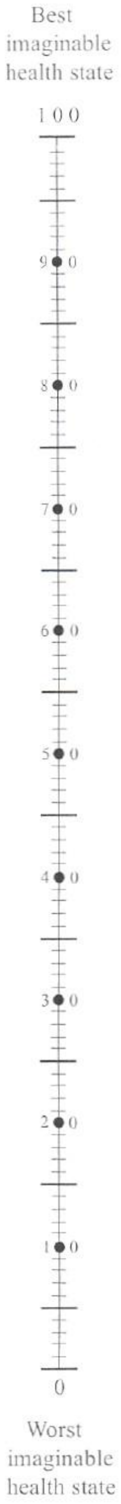
Anxiety / Depression

I am not anxious or depressed ☐
I am moderately anxious or depressed ☐
I am extremely anxious or depressed ☐

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is today.

Your own health state today



Although all the data we gather will be treated anonymously, it will help us to understand your answers better if we have a little background data from everyone, as covered in the following questions.

Have you experienced serious illness (not including your own cardiac problems)?

	Yes	No
In you yourself	☐	☐
In your family	☐	☐
In caring for others	☐	☐

What is your age in years? ☐☐

Are you:

Male ☐
Female ☐

Are you:

A current smoker ☐
An ex smoker ☐
A never smoker ☐

Do you now, or did you ever, work in health or social services

Yes ☐
No ☐

Is so, in what capacity?

Which of the following best describes your main activity?

In employment / self employed ☐
Retired ☐
Housework ☐
Student ☐
Seeking work ☐
Other (please specify) ☐

Did your education continue after the minimum school leaving age?

Yes ☐
No ☐

Did you have a Degree or equivalent professional qualification?

Yes ☐
No ☐

If you know your postcode, would you please write it in here:

APPENDIX E

Post-surgery Questionnaire
(all 3 time points)

Coronary Artery Bypass Patients Background Questions

All the questions we would like you to answer are to do with your cardiac problems that have led to you having a bypass operation. Initially we would like some basic information on your cardiac condition, your social situation, and your diet.

For questions 3, 4 and 5 please write your answers in the boxes below each question. For question 7 please fill in the number of years and months (e.g. 03 Years 09 Months). For all the other questions please cross all the boxes that apply to you.

1 Are your cardiac problems still affecting your health?

Yes ☐ ☐ No

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2 Would you say your health is:

☐ better than before you had your bypass operation
☐ about the same as before the bypass operation
☐ worse than before your bypass operation

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3 Who do you live with at the moment?

---

4 Are any of the people mentioned in the question above dependent on you financially?

---

5 Are any of the people mentioned in question four dependent on you for their day to day care?

---

6 Do you currently work?

☐ Yes, go to question 9
☐ Retired
☐ Not working at the moment, due to cardiac problems
☐ Unemployed at the moment

7 How long is it since you last worked?

☐☐ years ☐☐ months

8 Do you intend to return to work?

Yes ☐ ☐ No

9 How many units of alcohol do you drink a week (1 unit is half a pint of beer or lager, a glass of wine or a standard measure of spirits)?

☐ None ☐ 1 - 5 ☐ 6 - 10 ☐ 11 - 15 ☐ 16 - 20 ☐ >20

For each of the following questions please cross all boxes that are applicable.

10 What type of spread do you use for sandwiches and toast?

☐ Butter
☐ Margarine Please specify brand ____________________
☐ Low fat margarine
☐ Sunflower margarine
☐ Olive oil margarine
☐ Soya margarine
☐ Fish oil based margarine
☐ Other

11 What type of fat do you use for cooking, grilling, baking, roasting and frying?

☐ Lard
☐ Vegetable oil Please specify brand ____________________
☐ Sunflower oil
☐ Rape seed oil
☐ Olive oil
☐ Corn oil
☐ Peanut oil
☐ Other

12 What type of bread do you eat on a regular basis?

☐ White bread
☐ Brown bread Please specify brand ____________________
☐ Wholemeal bread
☐ Granary bread
☐ Soya enriched
☐ White bread with added fibre
☐ Other

13 What type of breakfast cereal do you have? (if you do not have cereal please go to question 14)

☐ Cornflakes
☐ Branflakes Please specify brand ____________________
☐ Sugar coated ie: Frosties
☐ Weetabix
☐ Muesli
☐ Sugar Free Muesli
☐ Porridge
☐ Other

14 Do you take sugar in your drinks and on cereals? (if not then go to question 15)

☐ 1 teaspoon in the whole day
☐ 2 - 4 teaspoons in the whole day
☐ 5 -7 teaspoons in the whole day
☐ 8 - 10 teaspoons in the whole day
☐ more than 10 teaspoons in the whole day Please specify __________

15 What type of milk do you use?

☐ Normal full fat milk
☐ Semi skimmed milk
☐ Skimmed milk
☐ Other Please specify ____________________

16 What type of cheese do you eat?

☐ Normal cheddar or similar
☐ Low fat cheddar or similar
☐ Edam or similar
☐ Soft cheese ie Philadelphia or triangles
☐ Low fat soft cheese
☐ Cottage cheese
☐ Other Please specify ____________________

ILLNESS PERCEPTION QUESTIONNAIRE (IPQ-R)

YOUR VIEWS ABOUT YOUR CARDIAC PROBLEMS

Listed below are a number of symptoms that you may or may not have experienced since your cardiac problems started. Please indicate by ticking Yes or No, whether you have experienced any of these symptoms since your cardiac problems began, and whether you believe that these symptoms are related to your condition.

	I have experienced this symptom since my cardiac problems began		This symptom is related to my cardiac problems	
Pain	Yes ☐	☐ No	Yes ☐	☐ No
Sore Throat	Yes ☐	☐ No	Yes ☐	☐ No
Nausea	Yes ☐	☐ No	Yes ☐	☐ No
Breathlessness	Yes ☐	☐ No	Yes ☐	☐ No
Weight Loss	Yes ☐	☐ No	Yes ☐	☐ No
Fatigue	Yes ☐	☐ No	Yes ☐	☐ No
Stiff Joints	Yes ☐	☐ No	Yes ☐	☐ No
Sore Eyes	Yes ☐	☐ No	Yes ☐	☐ No
Wheeziness	Yes ☐	☐ No	Yes ☐	☐ No
Headaches	Yes ☐	☐ No	Yes ☐	☐ No
Upset Stomach	Yes ☐	☐ No	Yes ☐	☐ No
Sleep Difficulties	Yes ☐	☐ No	Yes ☐	☐ No
Dizziness	Yes ☐	☐ No	Yes ☐	☐ No
Loss of Strength	Yes ☐	☐ No	Yes ☐	☐ No

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

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

VIEWS ABOUT YOUR cardiac problems	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
My cardiac problems will last a short time	☐	☐	☐	☐	☐
My cardiac problems are likely to be permanent rather than temporary	☐	☐	☐	☐	☐
My cardiac problems will last for a long time	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
These cardiac problems will pass quickly	☐	☐	☐	☐	☐
I expect to have these cardiac problems for the rest of my life	☐	☐	☐	☐	☐
My cardiac problems are a serious condition	☐	☐	☐	☐	☐
My cardiac problems have major consequences on my life	☐	☐	☐	☐	☐
My cardiac problems do not have much effect on my life	☐	☐	☐	☐	☐
My cardiac problems strongly affect the way others see me	☐	☐	☐	☐	☐
My cardiac problems have serious financial consequences	☐	☐	☐	☐	☐
My cardiac problems cause difficulties for those who are close to me	☐	☐	☐	☐	☐
There is a lot which I can do to control my symptoms	☐	☐	☐	☐	☐
What I do can determine whether my cardiac problems get better or worse	☐	☐	☐	☐	☐
The course of my cardiac problems depends on me	☐	☐	☐	☐	☐
Nothing I do will affect my cardiac problems	☐	☐	☐	☐	☐
I have the power to influence my cardiac problems	☐	☐	☐	☐	☐
My actions will have no affect on the outcome of my cardiac problems	☐	☐	☐	☐	☐
My cardiac problems will improve in time	☐	☐	☐	☐	☐
There is very little that can be done to improve my cardiac problems	☐	☐	☐	☐	☐
My treatment will be effective in curing my cardiac problems	☐	☐	☐	☐	☐
The negative effects of my cardiac problems can be prevented (avoided) by my treatment	☐	☐	☐	☐	☐
My treatment can control my cardiac problems	☐	☐	☐	☐	☐
There is nothing which can help my condition	☐	☐	☐	☐	☐
The symptoms of my condition are puzzling to me	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
My cardiac problems are a mystery to me	☐	☐	☐	☐	☐
I don't understand my cardiac problems	☐	☐	☐	☐	☐
My cardiac problems don't make any sense to me	☐	☐	☐	☐	☐
I have a clear picture or understanding of my condition	☐	☐	☐	☐	☐
The symptoms of my cardiac problems change a great deal from day to day	☐	☐	☐	☐	☐
My symptoms come and go in cycles	☐	☐	☐	☐	☐
My cardiac problems are very unpredictable	☐	☐	☐	☐	☐
I go through cycles in which my cardiac problems get better and worse.	☐	☐	☐	☐	☐
I get depressed when I think about my cardiac problems	☐	☐	☐	☐	☐
When I think about my cardiac problems I get upset	☐	☐	☐	☐	☐
My cardiac problems make me feel angry	☐	☐	☐	☐	☐
My cardiac problems do not worry me	☐	☐	☐	☐	☐
Having these cardiac problems makes me feel anxious	☐	☐	☐	☐	☐
My cardiac problems make me feel afraid	☐	☐	☐	☐	☐

CAUSES OF MY CARDIAC PROBLEMS

We are interested in what you consider may have been the cause of your cardiac problems. As people are very different, there is no correct answer for this question. We are most interested in your own views about the factors that caused your condition rather than what others including doctors or family may have suggested to you. Below is a list of possible causes for your condition. Please indicate how much you agree or disagree that they were causes for you by ticking the appropriate box.

POSSIBLE CAUSES

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Stress or worry	☐	☐	☐	☐	☐
Hereditary - it runs in my family	☐	☐	☐	☐	☐
A germ or virus	☐	☐	☐	☐	☐
Diet or eating habits	☐	☐	☐	☐	☐
Chance or bad luck	☐	☐	☐	☐	☐

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Poor medical care in my past	☐	☐	☐	☐	☐
Pollution in the environment	☐	☐	☐	☐	☐
My own behaviour	☐	☐	☐	☐	☐
My mental attitude e.g. thinking about life negatively	☐	☐	☐	☐	☐
Family problems or worries caused my cardiac problems	☐	☐	☐	☐	☐
Overwork	☐	☐	☐	☐	☐
My emotional state e.g. feeling down, lonely, anxious, empty	☐	☐	☐	☐	☐
Ageing	☐	☐	☐	☐	☐
Alcohol	☐	☐	☐	☐	☐
Smoking	☐	☐	☐	☐	☐
Accident or injury	☐	☐	☐	☐	☐
My personality	☐	☐	☐	☐	☐
Altered immunity	☐	☐	☐	☐	☐

In the table below, please list in rank-order the three most important factors that you now believe caused YOUR cardiac problems. You may use any of the items from the box above, or you may have additional ideas of your own.

The most important causes for me:-

1

2

3

Coping with Health Injuries and Problems Scale (CHIP)

The following are ways of reacting to health problems, such as cardiac problems, sickness, or injuries. We are interested in your recent cardiac problems. Please tick the box that indicates how much you have engaged in these types of activities when encountering your cardiac problems.

	not at all	rarely	sometimes	often	very much
Think about better times	☐	☐	☐	☐	☐
Stay in bed	☐	☐	☐	☐	☐
Find out more information	☐	☐	☐	☐	☐
Wonder "why me"	☐	☐	☐	☐	☐
Be with others	☐	☐	☐	☐	☐
Rest when tired	☐	☐	☐	☐	☐
Seek treatment quickly	☐	☐	☐	☐	☐
Feel angry	☐	☐	☐	☐	☐
Daydream	☐	☐	☐	☐	☐
Sleep	☐	☐	☐	☐	☐
Focus on getting better	☐	☐	☐	☐	☐
Become frustrated	☐	☐	☐	☐	☐
Enjoy attention from people	☐	☐	☐	☐	☐
Conserve energy	☐	☐	☐	☐	☐
Learn more	☐	☐	☐	☐	☐
Think about things I can't do	☐	☐	☐	☐	☐
Plan for the future	☐	☐	☐	☐	☐
Stay warm	☐	☐	☐	☐	☐
Comply with advice	☐	☐	☐	☐	☐
Fantasise about being healthy	☐	☐	☐	☐	☐
Listen to music	☐	☐	☐	☐	☐
Make surroundings quiet	☐	☐	☐	☐	☐
Follow doctor's advice	☐	☐	☐	☐	☐
Wish it hadn't happened	☐	☐	☐	☐	☐
Invite company	☐	☐	☐	☐	☐
Stay quiet	☐	☐	☐	☐	☐
Take medications on time	☐	☐	☐	☐	☐
Think about being vulnerable	☐	☐	☐	☐	☐
Have nice things around	☐	☐	☐	☐	☐
Get comfortable	☐	☐	☐	☐	☐
Find out about treatments	☐	☐	☐	☐	☐
Worry about my health	☐	☐	☐	☐	☐

MACNEW HEART DISEASE HEALTH-RELATED QUALITY OF LIFE QUESTIONNAIRE

I would now like to ask you some questions about how you have been feeling **DURING THE LAST 2 WEEKS**.

Please check the box ☒ that matches your answer

---

1 In general, how much of the time during the last 2 weeks have you felt frustrated, impatient or angry?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

2 How often during the last 2 weeks have you felt worthless or inadequate?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

3 In the last 2 weeks, how much of the time did you feel very confident and sure that you could deal with your heart problem?

NONE OF THE TIME ☐
A LITTLE OF THE TIME ☐
SOME OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
MOST OF THE TIME ☐
ALMOST ALL OF THE TIME ☐
ALL OF THE TIME ☐

4 **In general how much of the time did you feel discouraged or down in the dumps during the last 2 weeks?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

5 **How much of the time during the past 2 weeks did you feel relaxed and free of tension?**

NONE OF THE TIME ☐
A LITTLE OF THE TIME ☐
SOME OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
MOST OF THE TIME ☐
ALMOST ALL OF THE TIME ☐
ALL OF THE TIME ☐

6 **How often during the last 2 weeks have you felt worn out or low in energy?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

7 **How happy, satisfied, or pleased have you been with your personal life during the last 2 weeks?**

VERY DISSATISFIED, UNHAPPY MOST OF THE TIME ☐
GENERALLY DISSATISFIED, UNHAPPY ☐
SOMEWHAT DISSATISFIED, UNHAPPY ☐
GENERALLY SATISFIED, PLEASED ☐
HAPPY MOST OF THE TIME ☐
VERY HAPPY MOST OF THE TIME ☐
EXTREMELY HAPPY, COULD NOT HAVE BEEN MORE SATISFIED OR PLEASED ☐

---

8 **In general, how often during the last 2 weeks have you felt restless, or as if you were having difficulty trying to calm down?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

9 **How much shortness of breath have you experienced during the last 2 weeks while doing your day-to-day physical activities?**

EXTREME SHORTNESS OF BREATH ☐
VERY SHORT OF BREATH ☐
QUITE A BIT OF SHORTNESS OF BREATH ☐
MODERATE SHORTNESS OF BREATH ☐
SOME SHORTNESS OF BREATH ☐
A LITTLE SHORTNESS OF BREATH ☐
NO SHORTNESS OF BREATH ☐

10 How often during the last 2 weeks have you felt tearful, or like crying?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

11 How often during the last 2 weeks have you felt as if you are more dependent than you were before your heart problem?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

12 How often during the last 2 weeks have you felt you were unable to do your usual social activities, or social activities with your family?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

13 How often during the last 2 weeks have you felt as if others no longer have the same confidence in you as they did before your heart problem?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

14 How often during the last 2 weeks have you experienced chest pain while doing your day-to-day activities?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

15 How often during the last 2 weeks have you felt unsure of yourself or lacking in self-confidence?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

16 **How often during the last 2 weeks have you been bothered by aching or tired legs?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

17 **During the last 2 weeks, how much have you been limited in doing sports or exercise as a result of your heart problem?**

EXTREMELY LIMITED ☐
VERY LIMITED ☐
LIMITED QUITE A BIT ☐
MODERATELY LIMITED ☐
SOMEWHAT LIMITED ☐
LIMITED A LITTLE ☐
NOT LIMITED AT ALL ☐

---

18 **How often during the last 2 weeks have you felt apprehensive or frightened?**

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

19 How often during the last 2 weeks have you felt dizzy or lightheaded?

- ALL OF THE TIME ☐
- MOST OF THE TIME ☐
- A GOOD BIT OF THE TIME ☐
- SOME OF THE TIME ☐
- A LITTLE OF THE TIME ☐
- HARDLY ANY OF THE TIME ☐
- NONE OF THE TIME ☐

---

20 In general during the last 2 weeks, how much have you been restricted or limited as a result of your heart problem?

- EXTREMELY LIMITED ☐
- VERY LIMITED ☐
- LIMITED QUITE A BIT ☐
- MODERATELY LIMITED ☐
- SOMEWHAT LIMITED ☐
- LIMITED A LITTLE ☐
- NOT LIMITED AT ALL ☐

---

21 How often during the last 2 weeks have you felt unsure as to how much exercise or physical activity you should be doing?

- ALL OF THE TIME ☐
- MOST OF THE TIME ☐
- A GOOD BIT OF THE TIME ☐
- SOME OF THE TIME ☐
- A LITTLE OF THE TIME ☐
- HARDLY ANY OF THE TIME ☐
- NONE OF THE TIME ☐

22 How often during the last 2 weeks have you felt as if your family is being over-protective toward you?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

23 How often during the past 2 weeks have you felt as if you were a burden on others?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

---

24 How often during the past 2 weeks have you felt excluded from doing things with other people because of your heart problem?

ALL OF THE TIME ☐
MOST OF THE TIME ☐
A GOOD BIT OF THE TIME ☐
SOME OF THE TIME ☐
A LITTLE OF THE TIME ☐
HARDLY ANY OF THE TIME ☐
NONE OF THE TIME ☐

25 How often during the past 2 weeks have you felt unable to socialise because of your heart problem?

- ALL OF THE TIME ☐
- MOST OF THE TIME ☐
- A GOOD BIT OF THE TIME ☐
- SOME OF THE TIME ☐
- A LITTLE OF THE TIME ☐
- HARDLY ANY OF THE TIME ☐
- NONE OF THE TIME ☐

26 In general, during the last 2 weeks how much have you been physically restricted or limited as a result of your heart problem?

- EXTREMELY LIMITED ☐
- VERY LIMITED ☐
- LIMITED QUITE A BIT ☐
- MODERATELY LIMITED ☐
- SOMEWHAT LIMITED ☐
- LIMITED A LITTLE ☐
- NOT LIMITED AT ALL ☐

27 How often during the last 2 weeks have you felt your heart problem limited or interfered with sexual intercourse?

- ALL OF THE TIME ☐
- MOST OF THE TIME ☐
- A GOOD BIT OF THE TIME ☐
- SOME OF THE TIME ☐
- A LITTLE OF THE TIME ☐
- HARDLY ANY OF THE TIME ☐
- NONE OF THE TIME ☐

28 Thinking about your last cardiac operation, given your experiences over again,would you be happy to be treated in exactly the same way?

- ☐ DEFINITELY NO
- ☐ POSSIBLY
- ☐ DEFINITELY YES
- ☐ PROBABLY NO
- ☐ PROBABLY YES

By placing a tick in one box in each group below, please indicate which statement best describes your own health state today.

Mobility

I have no problems in walking about ☐
I have some problems walking about ☐
I am confined to bed ☐

Self Care

I have no problems with self care ☐
I have some problems washing or dressing myself ☐
I am unable to wash or dress myself ☐

Usual Activities (e.g. work, study, house work, family or leisure activities)

I have no problems with performing my usual activities ☐
I have some problems with performing my usual activities ☐
I am unable to perform my usual activities ☐

Pain / Discomfort

I have no pain or discomfort ☐
I have moderate pain or discomfort ☐
I have extreme pain or discomfort ☐

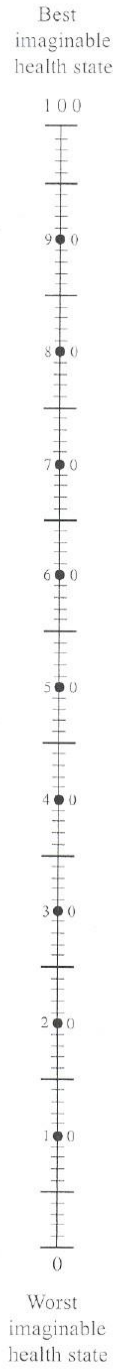
Anxiety / Depression

I am not anxious or depressed ☐
I am moderately anxious or depressed ☐
I am extremely anxious or depressed ☐

To help people say how good or bad a health state is, we have drawn a scale (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is today, in your opinion. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is today.

Your own health state today



Although all the data we gather will be treated anonymously, it will help us to understand your answers better if we have a little background data from everyone, as covered in the following questions.

Have you experienced serious illness (not including your own cardiac problems)?

	Yes	No
In you yourself	☐	☐
In your family	☐	☐
In caring for others	☐	☐

What is your age in years? ☐☐

Are you:

Male ☐

Female ☐

Are you:

A current smoker ☐

An ex smoker ☐

A never smoker ☐

Do you now, or did you ever, work in health or social services

Yes ☐

No ☐

Is so, in what capacity?

Which of the following best describes your main activity?

In employment / self employed	☐
Retired	☐
Housework	☐
Student	☐
Seeking work	☐
Other (please specify)	☐

Did your education continue after the minimum school leaving age?

Yes	☐
No	☐

Did you have a Degree or equivalent professional qualification?

Yes	☐
No	☐

If you know your postcode, would you please write it in here:

APPENDIX F

Cardiac Rehabilitation Attendance Questionnaire

Cardiac Surgery Patients Attendance at Cardiac Rehabilitation

2

Were you invited to attend a cardiac rehabilitation programme?

☐ Yes ☐ No

Did you attend an assessment session?

☐ Yes ☐ No

How many sessions did you attend in total (state number)? ☐☐

If you attended at least one session, please answer the following:

When was this approximately?

m m / y y y y

☐☐ / ☐☐☐☐

Did you take part in any exercise during any of these sessions?

☐ Yes ☐ No

Did you attend talks on any of the following topics (please tick all that apply)?

Healthy heart	☐	Healthy eating	☐
Medication	☐	Making sense of food labels	☐
Looking after yourself	☐	Stress	☐
Appropriate physical activity	☐	Relaxation	☐
Flexibility and mobility	☐	Quiz	☐

Were you told about any on-going exercise programmes that you could go on after you had finished your rehabilitation sessions?

☐ Yes ☐ No

If so, have you joined one of these?

☐ Yes ☐ No

Please indicate how useful you found the rehabilitation programme

Very useful in aiding my recovery			Some use in aiding my recovery			Did not aid my recovery at all
☐	☐	☐	☐	☐	☐	☐

Any other comments that you think may be useful.

Thank you again for your time.

Appendix G

Further Details of Chapter Four Literature Searches

Appendix G: Search strategy for the targeted literature reviews

Targeted review one: Do IPs predict QoL after cardiac surgery?

Data collection

The author of this thesis (EW) searched the Psycinfo, Web of Knowledge, PubMed and CINAHL databases to identify published work that related to the review question, these searches were updated in January 2010. Search strategies used key words that were identical for all databases, these are given below:

Illness perceptions (search field 1): “Common-Sense model” OR perceptions OR cognitions OR representations OR beliefs

Cardiac surgery (search field 2): Cardiac OR “Heart attack” OR myocardial infarction” OR “Coronary artery bypass graft” OR CABG OR percutaneous transluminal coronary angioplasty” OR PTCA OR “coronary artery disease” OR CAD OR “coronary heart disease” OR CHD OR “cardiovascular disease”

Quality of life (search field 3): “quality of life” OR “well being” OR well-being

Searches were restricted to English language papers that were published in peer-reviewed journals, and had to be a primary analysis of data. A starting date restriction of January 1996 was also imposed.

Studies were included if they met the following criteria:

1. Participants were at least 18 years of age
2. Illness perceptions were measured using either the IPQ, IPQ-R or another questionnaire measure or interview question that could be mapped onto part of Leventhal’s CSM e.g. beliefs about causes of heart disease
3. There was an indication that cardiac surgery (CABG or PTCA) had been carried out or was planned to be carried out on at least part of the participant group
4. There was some measure of QoL or well-being that was related to the participants’ illness perceptions

The initial sets of papers from each database were combined and any duplicates removed. EW carried out the initial sift of these from their titles and abstracts, and selected the studies that were relevant for this literature review. Full papers for these were then obtained and checked against the inclusion criteria.

Process reliability checks

To ensure reliability of the extraction criteria used 25% of the original search results were reviewed by AW, any disagreements were then discussed and resolved. A further 25% of the original search results were then reviewed by both AW and EW, and a 100% agreement was reached.

Data extraction

Due to the small number of papers identified a formal data extraction from was not developed, instead relevant information was identified under the following headings:

1. Aims of the study
2. How these related to the review question posed
3. Participants in the study
4. Measures used
5. Analysis used
6. Results obtained
7. An overall evaluation of the quality of the study (e.g. how well the study met its aims, measures used, process of the research)

This was carried out by EW initially and then refined after review by AW. Any discrepancies were discussed and resolved and minor adjustments made to the information extracted where needed.

Targeted review two: Do IPs predict attendance at cardiac rehabilitation, or lifestyle change after cardiac surgery?

As before, EW searched the Psycinfo, Web of Knowledge, PubMed and CINAHL databases to identify published work that related to the review question, these searches were updated in January 2010. The keyword search strategies used for each of these databases are given below:

Illness perceptions (search field 1): “Common-Sense model” OR perceptions OR cognitions OR representations OR beliefs

Cardiac surgery (search field 2): Cardiac OR “Heart attack” OR myocardial infarction” OR “Coronary artery bypass graft” OR CABG OR percutaneous transluminal coronary angioplasty” OR angioplasty OR PTCA OR “coronary artery disease” OR CAD OR “coronary heart disease” OR CHD OR “cardiovascular disease”

Cardiac rehabilitation or lifestyle change (search field 3): rehabilitation OR diet OR smoking OR exercise OR lifestyle OR behaviour OR behaviour

In addition, due to the large number of studies identified in the previous review question relating to computer-aided design in relation to the CAD term, a fourth search field was also used that specified not computer-aided design. As in the first review question searches were restricted to English language papers that were published in peer-reviewed journals, and had to be a primary analysis of data. The starting date restriction of January 1996 was also imposed once more.

Studies were included if they met the following criteria:

1. Participants were at least 18 years of age
2. Illness perceptions were measured using either the IPQ, IPQ-R or another questionnaire measure or interview question that could be mapped onto part of Leventhal’s CSM e.g. beliefs about causes of heart disease
3. There was an indication that cardiac surgery (CABG or PTCA) had been carried out or was planned to be carried out on at least part of the participant group
4. There was some indication of attendance at cardiac rehabilitation, or of behaviours that might be related to appropriate lifestyle change after cardiac

events such as surgery or myocardial infarction (e.g. smoking status, exercise, dietary factors)

As before, the initial sets of papers from each database were combined and any duplicates removed. EW carried out the initial sift of these from their titles and abstracts, and selected the studies that were relevant for this literature review. Full papers for these were then obtained and checked against the inclusion criteria.

Process reliability checks

To ensure reliability of the extraction criteria used 25% of the original search results were reviewed by AW. Both researchers extracted the same papers indicating 100% agreement.

Data extraction

As in the first review question only a small number of papers were identified, therefore a formal data extraction from was not developed, instead relevant information was identified under the following headings:

1. Aims of the study
2. How these related to the review question posed
3. Participants in the study
4. Measures used
5. Analysis used
6. Results obtained
7. An overall evaluation of the quality of the study (e.g. how well the study met its aims, measures used, process of the research)

This was carried out by EW initially and then refined after review by AW. Any discrepancies were discussed and resolved and minor adjustments made to the information extracted where needed.