BODY IMAGE AND PHYSICAL ACTIVITY IN PEOPLE LIVING WITH HEART DISEASE

by

Kathryn Ann Lightfoot

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The undersigned hereby certify that they have read and recommend to the Faculty of Graduate Studies for acceptance a thesis entitled "BODY IMAGE AND PHYSICAL ACTIVITY IN PEOPLE LIVING WITH HEART DISEASE" by Kathryn Ann Lightfoot in partial fulfillment of the requirements for the degree of Master of Arts.

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Readers: _____

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ABSTRACT

Context: Little is known about body image and its relationship with physical activity (PA) among people living with heart disease. **Purpose:** To determine the prevalence and stability of body image issues over time in heart patients, and to determine the bi-directional relationship between body image and PA over time. **Method:** Participants who completed cardiac rehabilitation (CR; n = 31), and who declined CR (n = 28) were recruited. Participants completed self-report questionnaires assessing body image and PA at two time intervals, three months apart. **Results:** Up to 9.7% of participants in CR and 10.7% of those not in CR reported high body image concerns. Repeated measures ANOVAs revealed body image changed over time in people not in CR (body surveillance, Wilk's $\lambda = .768$, $F = 8.15$, $p = .008$; control beliefs, Wilk's $\lambda = .837$, $F = 5.28$, $p = .030$). Linear regressions showed that minutes of moderate PA predicted body image (body shame, $\beta = -.372$, $t = -.2.12$, $p = .043$) in people in CR, and that body image (control beliefs) predicted minutes of moderate PA ($\beta = .384$, $t = 2.12$, $p = .044$) in people not in CR. **Conclusion/Implications:** This research has the potential to lead to the development of more effective PA interventions, thus improving the longevity and quality of life of heart patients.

LIST OF ABBREVIATIONS USED

CR	Cardiac Rehabilitation
OBC	Objectified Body Consciousness
PA	Physical Activity

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CHAPTER 1: INTRODUCTION

Context and Rationale

Cardiovascular disease is the number one cause of mortality in Canada and the province of Nova Scotia (Statistics Canada, 2007). Fortunately, increased exercise capacity, achieved through sufficient physical activity (PA), is the strongest predictor of longevity among heart patients (Myers et al., 2002). Too few cardiac patients, however, are engaging in sufficient PA to enjoy the associated health benefits and halt disease progression. Only a small minority (approximately 15%) of patients enrol in cardiac rehabilitation (CR) programs, which have proven successful in increasing exercise capacity (Ades et al., 1992; Marchionni et al., 2003). Six months after beginning CR, up to 70% of patients enrolled in these CR programs are successful in meeting PA guidelines (Oldridge & Jones, 1986). The majority of heart patients, however, never initiate any formal CR program after being discharged from the hospital (Ades et al., 1992; Balady et. al., 1994). Of these patients who do not enrol in CR, less than 50% achieve the recommended levels of PA six months after hospitalization (Reid et al., 2006).

Whether they are in a CR or a non-CR context, there appear to be barriers (e.g., low self-efficacy, poor attitudes and intentions with regards to exercise, depressive symptomology, etc.) that prevent heart patients from engaging in sufficient PA (Blanchard et. al., 2003; Bock et. al., 1997; Brezinka, Dusseldorp & Maes, 1998). Another important potential barrier that may impede PA in people living with heart disease is body image. Body dissatisfaction has been increasing over the past thirty to forty years, and a large percentage of adults (estimates range from 18% to 50%) in

North America report being unhappy with their bodies (Kruger, Lee, Ainsworth & Macera, 2008; Thompson, Heinber, Altabe, & Tantleff-Dunn, 1999). In addition, research in non-clinical populations has shown that people with poor body image tend to engage in less PA than people with healthier body image (Grogan, 2008; Hausenblas & Fallon, 2006). Unfortunately, there has been a dearth of research on body image in cardiac patients. The prevalence of body image disturbances, the stability of body image over time, the relationship between PA and body image, and between body image and PA in people living with heart disease, are all unknown.

The research undertaken as part of this thesis aims to address this gap in the literature on cardiac patients, and could have a number of practical implications. For example, if higher PA is found to predict better body image in people living with heart disease, then health practitioners would be able to advertise this to heart patients as yet another benefit of, and additional motivation for, engaging in regular PA. Perhaps more importantly, if better body image is found to predict more PA, then adding a psychological body image intervention to a patient's course of treatment after a heart event could help to increase PA in cardiac patients. In both cases, the potential exists to improve the longevity and quality of life of this vulnerable population, and to diminish the financial burden that cardiovascular disease places on our health care system.

Research Questions

The research questions that guided my thesis were as follows:

1) What is the prevalence of body image issues in people living with heart disease?*
2) Does body image change over time in people living with heart disease?*

3) Does PA predict body image in people living with heart disease?*

4) Does body image predict PA in people living with heart disease?*

*For both people A) completing a CR program, and B) not completing a CR program.

Terms

Cardiac rehabilitation (CR) is defined as "the enhancement and maintenance of cardiovascular health through individualized programs designed to optimize physical, psychological, social, vocational, and emotional status" (Canadian Association of Cardiac Rehabilitation, 2009). For example, a typical 12-week CR program would combine medically supervised exercise twice per week with nutrition and behaviour modification education, in an effort to minimize disease progression and recurrence of cardiac events (Capital Health, 2008).

In contrast, heart patients who choose *not to enrol in CR* tend to go home after their hospitalization with no formal exercise prescription or nutrition plan prior to discharge.

Body image is defined as "a person's perceptions, feelings and thoughts about his or her body… incorporating body size estimation, evaluation of body attractiveness and emotions associated with body shape and size" (Grogan, 2006, p. 524).

CHAPTER 2: LITERATURE REVIEW

In this section, I will discuss heart disease, the relationship between heart disease and PA in both CR and non-CR settings, the prevalence of body image disturbances and their stability over time in non-diseased populations, and the relationships between PA and body image, and body image and PA. I will also touch on body image issues in people with chronic health conditions, and the origins and applications of McKinley and Hyde's (1997) Objectified Body Consciousness scale.

Heart Disease: The Facts

Cardiovascular disease is the number one cause of mortality in Canada, and is responsible for approximately 32% of all deaths across the country (Statistics Canada, 2007). Diseases of the circulatory system are the leading cause of hospitalization for adults, with more than 309,000 patients accounting for 419,000 hospital visits in 2001-02 alone (Johnasen, Thillaiampalam, Nguyen & Sambell, 2005). In 1998, Health Canada estimated that cardiovascular disease was responsible for $18.5 billion in expenditures, or 11.6% of the total cost of all illnesses in Canada (Heart and Stroke Foundation of Canada, 2003). While averting or minimizing future cases of cardiovascular disease through primary prevention efforts would be ideal, there is clearly also a need to support the hundreds of thousands of Canadians already living with heart disease. This population normally ranges in age from as young as 30 to 80 years or older (Heart and Stroke Foundation of Canada, 2003).

Heart Disease, PA, and CR

CR has become the standard of care for patients following a heart event. Compared to usual hospital care, randomized control trials have shown that CR programs demonstrate a 20-26% relative reduction in cardiac mortality (O'Connor et al., 1989; Taylor et. al., 2004). In addition to reducing mortality, CR programs also reduce the number of rehospitalizations for cardiac events, and relieve some of the financial burden that heart disease places on our healthcare system (Belardinelli, 2004; Brown, Taylor, Noorani, Stone, & Skidmore, 2003). The effectiveness of CR programs lies in their ability to increase exercise capacity among their participants (Arthur, Smith, Kodis, & McKelvie, 2002; Jolly et al., 2003; Marchionni et al., 2003; Smith, Arthur, McKelvie, & Kodis, 2004), which has been shown to be the strongest predictor of decreased mortality risk in people living with heart disease (Myers et. al., 2002).

Even among heart patients who attend CR, the percentage of people engaging in sufficient levels of PA tends to decrease over time (Balady et. al., 1994; Burke, Dunbar-Jacob, & Hill, 1997; D'Angelo, Reid, & Pelletier, 2007; Oldridge, 1991). While adherence rates are typically quite high during the first three months of the structured program (up to 80%), only 28-64% of CR patients still adhere to their exercise program three months after CR, and less than 30% adhere beyond 1 year (Bock et. al., 1997; Brubacker et. al., 1996; Oldridge, & Jones, 1986; Moore, Ruland, Pashkow, & Blackburn, 1998). As such, the benefits gained during CR are likely diminishing at a fast rate, resulting in increased risk of comorbidity development, disease recurrence and/or mortality.

Heart Disease, PA, and no CR

Participation in CR programs has been reported to be as low as 15%, leaving as many as 85% of heart patients unlikely to achieve the levels of PA required to increase exercise capacity (Ades et al., 1992; Ayala et al., 2003; Jolly et al., 2003; Suskin et al., 2003). Current recommendations suggest that people with cardiovascular disease should expend 1500 kilocalories of energy per week or more through PA, in order to improve cardiorespiratory fitness and stop disease progression (Gibbons, 2003; Hambrecht et al., 1993). In the TEACH (Tracking Exercise After Cardiac Hospitalization) trial, researchers found that PA levels of heart patients not participating in CR programs declined from 2 months after hospitalization on; the proportion of participants achieving the 1500 kcal/week level declined from 58.6% at 2 months, to 49.5% at 6 months, down to 45.7% at 12 months after hospitalization (Reid et al., 2006). As can be seen from this trial, a large proportion of patients who do not complete CR are at increased risk for recurrence and/or mortality.

Clearly, regardless of the context (CR or no CR), there appear to be barriers that impede people living with heart disease from engaging in sufficient PA to enjoy the health benefits. Researchers have found that increased PA in cardiac patients is significantly associated with a number of variables, including increased task self efficacy (i.e., confidence in one's ability to perform the elemental aspects of a task, such as walking for 20 minutes), barrier self-efficacy (i.e., confidence that one can perform a task even under challenging circumstances), perceived behavioural control (perceived ease or difficulty of engaging in PA), exercise intentions, and perception of social support, and decreased anxiety, negative affect, and depressive symptomology (Blanchard, Rodgers,

Courneya, Daub, & Black, 2002; Blanchard et. al., 2003; Bock et. al., 1997; Brezinka, Dusseldorp, & Maes, 1998; Brezinka & Kittel, 1995; Hunt-Shanks, Blanchard, & Reid, 2009; Moore, Dolansky, Ruland, Pashkow, & Blackburn, 2003).

While this represents a promising area of research, it ignores other potential correlates that could help to explain PA levels in heart patients; to date, there has been a distinct lack of research exploring the relationship between *body image* and PA in cardiac patients. This thesis will attempt to address this gap in the literature. In the paragraphs that follow, I will argue that body image is relevant and potentially a key variable to consider in order to better understand PA behaviour in people living with heart disease.

Body Image: Prevalence of Disturbances

While the bulk of body image research over the past thirty years has focused on girls and young women, due in large part to the field's roots in treating eating disorders through clinical psychology, more recent research has expanded to include people of both genders and of all ages (Cash, 2004; Ferraro et. al., 2008; Grogan, 2006; Hargreaves & Tiggemann, 2006; Ricciardelli, McCabe, & Ridge, 2006; Strelan & Hargreaves, 2005). Indeed, body image disturbances have been found in men and women across the lifespan. For example, Frederick, Peplau and Lever (2006) surveyed 52,677 heterosexual adults between the ages of 18 and 65, and found that 11% of men and 21% of women rated their body as unattractive, and 16% of men and 31% of women avoided wearing a swimsuit in public. In a sample of 10,021 adults aged 18 and older from the National Physical Activity and Weight Loss Survey conducted in the U. S. A., 18% of participants (12.5% of men and 23.6% of women) reported not being satisfied with their current body size

(Kruger, Lee, Ainsworth, & Macera, 2008). Dissatisfaction with one's body is decidedly not an area of concern restricted only to adolescent girls and young women, and is pertinent to both males and females of all ages.

In addition, it appears as though the prevalence of body image disturbances have unfortunately been increasing over the past few decades. Three large scale cross-sectional surveys conducted by *Psychology Today* between 1972 and 1996 revealed that overall appearance dissatisfaction increased from 23% to 56% for women, and from 15% to 43% for men, over a span of only 24 years (Garner, 1997; Thompson, Heinber, Altabe, & Tantleff-Dunn, 1999).While the representativeness of the sample used for this study (readers of *Psychology Today* who responded to a questionnaire) is questionable, the strong increase in body image disturbances nonetheless reveals a striking trend.

While the prevalence of body image disturbances in people living with heart disease is currently unknown, with such a high prevalence among non-diseased adults, there is reason to believe that body image is an issue of concern among heart patients as well. Research undertaken as a part of this thesis will attempt address this gap in the literature.

Body Image: Stability/Change over Time

While body concern may be increasing with each generation, research would suggest that over the long term, dissatisfaction with one's body remains relatively stable across the lifespan (Grogan, 2006; Reel, SooHoo, Summerhays, & Gill, 2008; Tiggemann & Lynch, 2001; Tiggemann, 2004). For example, researchers have found that women's preoccupation with being overweight does not vary with age (Cash & Henry, 1995), nor

does their desire to be thinner (Allaz, Bernstein, Rouget, Archinard, & Morabia, 1998), their global body image (Paxton & Phythian, 1998), or their level of satisfaction with their appearance (Garner, 1997). Research on men, particularly older men, has been much less extensive, though it is clear that men continue to report body concerns well into adulthood (Ferraro et. al., 2008; McCabe & Ricciardelli, 2004).

Although body image may be relatively stable in most people over the long term, studies have also shown that interventions can lead to changes in body image. A number of different approaches have enjoyed success in lowering levels of body image disturbance, including cognitive behavioural therapy (Butters & Cash, 1987; Fisher & Thompson, 1994), experiential therapy (Arnold, 1994; Dibbell-Hope, 2000), psychoeducational programs (Cash, 1997; Springer, Winzelberg, Perkins, & Taylor, 1999), and exercise therapy (Arbour & Martin Ginis, 2008; Hausenblas & Fallon, 2008; Williams & Cash, 2001). The results of exercise therapy interventions are of particular interest for this thesis, insofar as they help to clarify the relationship between PA and body image, and will be discussed in more detail in the section that follows.

PA as a Predictor of Body Image

A large body of research in non-diseased populations suggests that PA can predict one's body image, with greater PA levels generally predicting greater satisfaction with one's body (Arbour & Martin Ginis, 2008; Burgess, Grogan, & Burwitz, 2006; Griffin & Kirby, 2007; Henry, Anshel, & Michael, 2006; LePage & Crowther, 2010; Lowery et al., 2005; Martin Ginis, Eng, Arbour, Hartman, & Philips, 2005; Reel et al., 2007; Sorenson, Anderssen, Hjerman, Holme, & Ursin, 1997; Tiggemann & Williamson, 2000; Williams

& Cash, 2001). In their meta-analysis of 121 published and unpublished studies, Hausenblas and Fallon (2006) found significant associations between PA and improved body image across several types of research design, including correlational studies, single group studies (i.e., compared pre- versus post-exercise intervention), and interventions (i.e., exercise versus non-exercise groups, compared post-exercise intervention). That is, across many studies, people who were physically active had a more positive body image than those who were inactive (68 correlational studies – overall mean effect size = 0.41); people who participated in a PA intervention reported higher body image scores post-intervention than pre-intervention (44 single-group studies – overall mean effect size = 0.24); and people who participated in a PA intervention reported a more positive body image post-intervention compared to those in a control group who did not receive the PA intervention (35 experimental studies – overall mean effect size = 0.28; Hausenblas & Fallon, 2006). As such, it appears that PA has a positive impact on body image in non-diseased populations. The magnitude of this relationship, however, remains unknown in people living with heart disease.

In a qualitative study of adults aged 35-78 with type 2 diabetes in France, women cited improved body image and a sense of well-being as major motives for engaging in PA (Ferrand, Perrin, & Nasarre, 2008). As diabetes often co-occurs with heart disease, with approximately 65% of people with diabetes ultimately dying from cardiovascular disease, there is reason to believe that body image may be related to PA in people living with heart disease as well (National Institute of Diabetes and Digestive and Kidney Diseases, 2005; Shakir et al., 2007).

Body Image as a Predictor of PA

While it is quite well established that PA can predict body image, a smaller body of literature suggests that body image may also predict PA. For instance, Greenleaf (2005) found that self-objectification (i.e., the extent to which a person has internalized an outsider's perspective of their body, focusing on how it looks rather than how it feels), as measured through the body surveillance subscale of McKinley and Hyde's (1996) Objectified Body Consciousness scale, was a significant predictor of PA in women aged 18 to 64, with higher self-objectification predicting lower PA levels. Examining a sample of more than 10,000 adults from the National Physical Activity and Weight Loss Survey, Kruger and colleagues (2008) found that irrespective of actual weight, people who reported being satisfied with their body size were more likely to engage in regular PA than those who reported being less satisfied. After adjustment for covariates, people who reported being 'somewhat satisfied' or 'not satisfied' had a 13% and 44% lower odds of being physically active than people who were 'very satisfied' with their body size.

In addition, research around PA in group settings has found that people who are highly conscious and anxious about others noticing and evaluating their respective bodies (i.e., experience social physique anxiety – similar in concept to McKinley's body surveillance reported above) are less likely to engage in PA, especially in the context of a group (Brunet & Sabiston, 2009; Crawford & Eklund, 1994; Hart, Leary, & Rejeski, 1989). For example, in a survey study of men and women ranging from 18 to 60 years in age, regression analysis indicated a significant negative relationship between social physique anxiety and PA, $F(1,298) = 19.02$, $p < .0001$, $R^2 = 6\%$ (Lantz, Hardy, & Ainsworth, 1997). While most of the research in this area is correlational in design, it

appears that certain components of body image, such as self-objectification or social physique anxiety, can predict PA in non-diseased populations. Whether body image can predict PA in people living with heart disease remains unknown.

Body Image in People with Chronic Health Conditions

Many chronic diseases, and their treatment, can result in changes in body image (Charmaz, 1995; Hurd Clarke & Griffin, 2008; Helman, 1995; Pruzinsky, 2004; Vamos, 1993). Disease-related changes in appearance, loss of physical function, reduced mobility, and pain can all affect one's psychological experience of one's body (Bury, 1982). The study of body image in people with medical conditions is a burgeoning field, but is as of yet in its infancy. As Pruzinsky argues, there is "no single more important need" in the entire field of body image than to "develop extensive programs of research that will help us better understand and ameliorate the body image suffering of the many millions of indiduals with medical conditions," (2004, p. 71).

Researchers have begun to explore body image in the context of a number of different chronic health conditions, including arthritis (Packham & Hall, 2002), cystic fibrosis (Wenninger, Weiss, Wahn, & Staab, 2003), Parkinson's disease (Caap-Ahlgren & Lannerheim, 2002), HIV/AIDS (Chapman, 2002), and diabetes (Bays et al., 2009; Ferrand, Perrin, & Nassarre, 2008). While the body experience of a specific disease varies by the characteristics of its presentation (Belgrave, 1990), a person's perceived functional ability appears to be a re-emerging theme. For example, in her attempt to create a clinically useful classification system of body image in chronic illness, Vamos (1995) identifies perceived competence (including cognitive ability, mobility, and sexual

functioning) as one aspect of body image most relevant to physical illness. In a qualitative study of 20 men and women aged 68 to 88 with multiple chronic conditions, a major theme linking body image and the loss of functional abilities was also identified (Hurd Clarke & Griffin, 2008).

In one of the few studies exploring body image in people living with heart disease, researchers found that a heart patient's self-reported functional status, or perception of their physiological capabilities, predicted body appearance satisfaction in a sample of 72 men attending CR (Lichtenberger, Martin Ginis, MacKenzie, & McCartney, 2003). Notably, clinician-reported physiological functioning, measured via exercise or diagnostic tesing, did not predict body appearance satisfaction. While this is an important finding, many aspects of body image in people living with heart disease remain unexplored.

Objectified Body Consciousness (OBC) Scale

The Objectified Body Consciousness (OBC) scale was used to measure body image in people living with heart disease in this study. Developed by McKinley and Hyde in 1996, the OBC scale is based on feminist theory (Bartky, 1988; Spitzack, 1990; Wolf, 1991). More specifically, the OBC scale was developed from a feminist social construction perspective, whereby the meanings that a given culture constructs are examined, rather than assuming that meaning is determined and objective (Bartky, 1988; Spitzack, 1990). The OBC scale was designed to incorporate three components that feminist theorists have deemed important to womens' body experiences: body surveillance, internalization of cultural body standards, and beliefs about appearance

control (Bartky, 1988; McKinley & Hyde, 1996; Spitzack, 1990). While originally validated with young and middle-aged women (McKinley & Hyde, 1996), the OBC scale has since also been validated with undergraduate men (McKinley, 1998). A number of studies have now used the OBC scale to measure body image in men (John & Ebbeck, 2008; Lowery et al., 2005; McKinley, 2006).

The OBC scale consists of 3 subscales: body surveillance, body shame, and appearance control beliefs. The body surveillance subscale measures the extent to which a person thinks of their body in terms of how it looks, rather than how it feels. The body shame subscale measures whether one feels one is a bad person if one's body does not meet the prescribed cultural ideal. The appearance control belief subscale measures whether a person believes that with enough effort, they can control the appearance of their body, versus believing that the appearance of their body is largely determined by external factors, such as genetics (McKinley & Hyde, 1996).

The OBC scale was chosen for this study because it has been used a number of times to study the relationship between body image and PA (Greenleaf, 2005; Greenleaf & McGreer, 2006; John & Ebbeck, 2008; Lowery et al., 2005; Sinclair & Myers, 2004). As such, the use of this scale related directly to the third (Does PA predict body image in people living with heart disease?) and fourth (Does body image predict PA in people living with heart disease?) research questions of this thesis. It was also judged to possess a level of readability for participants that other scales considered for this study did not.

Research regarding the relationship between PA and the OBC scale has been mixed. In a study conducted by Greenleaf and McGreer (2006) with a group of 115 active (recruited from an aerobics class) and 70 sedentary (recruited from a general psychology

classe) female college students, no significant relationships were found between PA and body surveillance, or PA and body shame. Appearance control beliefs were not measured in this study. John and Ebbeck (2008) studied 231 undergraduate women and 163 undergraduate men enrolled in a required undergraduate course concerned with fitness, health and wellness, and found the multivariate relationship between the OBC scale and PA was non-significant.

In contrast, a study by Lowery and colleagues (2005) with a sample of 267 female and 156 male first-year college students found that more positive health-related behvaiours (including engaging in PA) were significantly and negatively related to body surveillance and body shame, and positively related to control beliefs. That is, those with high body surveillance, high body shame, or low appearance control beliefs were less likely to engage in PA. Sinclair & Myers (2004) also found significant positive correlations between appearance control beliefs and wellness behaviours (e.g., engaging in PA, good nutrition, and stress management) in a sample of 190 female undergraduate students. In a study with 194 physically active older women aged 39 to 64, Greenleaf (2005) found a significant negative correlation between body surveillance and PA; those who thought more about their body in terms of how it looked, rather than how if felt, reported engaging in fewer metabolic equivalents (METs) of PA over the past 3 months.

Unfortunately, there has been a paucity research on body image and on its relationship with PA in people living with heart disease. With the widespread existence of body image disturbances and significant body image-PA and PA-body image relationships in non-diseased populations, examining these issues among heart patients in particular represents a promising new area of research, and would address a significant

gap in the literature. While participating in regular PA is beneficial to virtually all, it is of particular importance to people living with heart disease. Notably, increased exercise capacity (achieved through regular PA) is one of the strongest predictors of longevity among heart patients (Myers et. al., 2002). If body image is an issue of concern among heart patients, there could be a number of practical implications. For example, if increased PA is found to predict better body image, this could be used by health practitioners as yet another motivator to encourage heart patients to engage in PA. (e.g., if you engage in regular PA, you will look and feel better about your body). Perhaps more importantly, if better body image is found to predict higher PA rates among heart patients, then a body image intervention could be incorporated into the prescribed care for patients following a heart event in order to increase their PA. In both cases, the potential exists to improve the longevity and quality of life of this vulnerable population, and to diminish the financial burden that cardiovascular disease places on our health care system. Informed by my review of the literature, my research objectives and hypotheses are presented in the section that follows (Chapter 3, page 17).

CHAPTER 3: RESEARCH OBJECTIVES AND HYPOTHESES

Objective #1. To determine the overall prevalence of body image issues in heart patients attending CR (Part A) and not attending CR (Part B). Across both contexts, it is hypothesized that approximately 20% of participants will suffer from body image concerns (Kruger, Lee, Ainsworth & Macera, 2008; Thompson, Heinber, Altabe, & Tantleff-Dunn, 1999).

Objective #2. To determine if body image changes over time in heart patients attending CR (Part A – at baseline, and at the end of the 3 month CR program) and not attending CR (Part B – at 9 and 12 month periods following hospitalization)[1]. It is hypothesized that **A)**, for those attending CR, body image will improve between baseline and 3 months (Bock et. al., 1997; Brubacker et. al., 1996); and **B)**, for those not attending CR (i.e., who are not receiving an exercise type intervention), body image will remain relatively constant across the 9 and 12 month periods following hospitalization (Tiggemann & Lynch, 2001).

Objective #3. To determine if PA predicts body image in heart patients attending CR (Part A – at baseline and 3 months later) and not attending CR (Part B – at 9 and 12 months following hospitalization). It is hypothesized that greater PA levels at T1 will predict greater body image at T2 in both groups (Arbour & Martin Ginis, 2008).

Objective #4. To determine if body image predicts PA in heart patients attending CR (Part A – at baseline, and 3 months later) and not attending CR (Part B – at 9 and 12 months post-hospitalization). It is hypothesized that more positive body image at T1 will predict greater PA levels at T2 in both groups (Kruger et. al., 2008).

[1] Time intervals for Part B were restricted because recruitment for this project had already begun. A more detailed explanation for the particular time intervals used in this project is included in the Method section which follows (Chapter 4).

CHAPTER 4: METHOD

Context

This research was conducted in conjunction with two larger studies: Dr. Chris Blanchard's CIHR-funded project, *Understanding gender differences in exercise from a social ecological perspective during and after cardiac rehabilitation* (Part A), and Dr. Blanchard's NSHRF-funded project, *Using a social ecological approach to explain exercise behaviour from a gender perspective in cardiac patients not attending cardiac rehabilitation in Nova Scotia* (Part B). Both of these projects were already underway when research for this thesis project began. Dr. Blanchard's studies did not originally include a body image component; a one page addendum containing body image scales was added to the original survey instrument. While baseline recruiting was still in progress for the CIHR project at the time the addendum was added, the NSHRF project was already sending out its 9-month follow up surveys. It is for this reason that recruiting for Part A of my study began at baseline (the beginning of CR), while recruiting for Part B began at 9 months following hospitalization. This did not negatively affect my outcomes, as data was still collected at two consecutive time points, allowing me to meet my original research objectives. For the purposes of my thesis, the new body image data was analyzed alongside the existing PA measurements that Dr. Blanchard had incorporated as part of his initial design; determining the prevalence of body image concerns, the stability of body image over time, and the relationship between PA and body image, and body image and PA in people living with heart disease, were all original contributions to the larger projects.

Research Design

The study was split into two major components, in order to obtain my four research objectives for both

i) heart patients who choose to participate in CR (Part A), and

ii) heart patients who choose not to participate in CR (Part B).

While at first glance, the existence of two groups may make it appear as though the research design was quasi-experimental, Part B was not intended to serve as a comparison group for Part A. The timeline for data measurement for both Part A and B was not the same (refer to Figure 1 below and Figure 2, next page), and no attempt was made to match participants from Part A to 'similar' participants in Part B (Shi, 2008). In addition, participants in Parts A and B were in different stages of adaptation to their heart condition, with those in Part B being recruited directly following their heart event, and those in Part A when they have recuperated sufficiently to begin CR. In essence, the design of this research consists of two separate *non-experimental longitudinal survey studies* (McMillan, 2008).

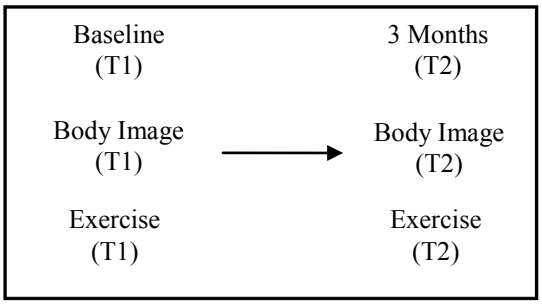

Figure 1. Measurement Points for Participants Completing a CR Program (Part A)

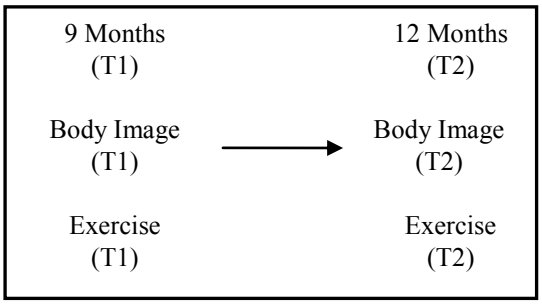

Figure 2. Measurement Points for Participants Not Completing a CR Program (Part B)

Participants and procedure.

Part A. Participants for Part A were recruited from the *Cardiovascular Health in Motion Program*, a hospital-based CR program servicing approximately 400 patients per year at the Nova Scotia Rehabilitation Centre in the city of Halifax. Patients in this CR program partook in medically supervised PA for 60 minutes once or twice a week for 12 weeks in a group setting, with up to 20 people per group. Average group sizes were normally 8-12 people. Sessions began with a warm-up, then patients used treadmills, stationary bicycles, and arm cycles, and finished with a cool-down. Physiotherapists and nurses were on hand to make sure that patients were comfortable and safe, yet challenging themselves to achieve personalized PA goals (e.g., speed on treadmill, resistance on exercise bike, etc.). Patients also received group educational sessions once per week, on topics such as nutrition, behavior change, managing heart disease, etc. (Capital Health, 2008).

Participants were eligible to participate in the study if they: 1) had heart disease and had been referred to CR by a physician; 2) were able to walk unassisted; 3) were 19 years of age or older; and 4) were able to read and write in English. Potential participants were approached on site during the second week of their CR program.

When potential participants were approached, a verbal description of the study was given, and those who agreed to participate were asked to sign an informed consent. They then completed a baseline questionnaire, including a self-report measure of their current physical activity level, and a body image scale (see *Measures* section below for more details). As the study was longitudinal in design, participants were asked to complete the same questionnaire at two time intervals. Participants in Part A were given the questionnaire at baseline, and at the end of their CR program 3 months later (see Figure 1, p. 16). All of the questionnaire surveys were self-administered.

Follow-up questionnaires for Part A were sent to participants through the mail two weeks prior to the 3 month mark, along with a stamped and addressed return envelope. In order to minimize participant attrition, a reminder post-card was sent 1 week later (i.e. 1 week prior to the 3 month mark), and a full package another 2 weeks later (i.e. 1 week after the 3 month mark) for participants who do not return their questionnaire promptly (Dillman, 1983). In addition to these multiple reminders and stamped return envelopes, personalized cover letters with original signatures, coloured paper, university sponsorship, and assurances of confidentiality were used to help increase response rates (Ransdell, 1996).

Part B. Participants for Part B were recruited from the Halifax Infirmary at the QEII Health Sciences Centre in Halifax, Nova Scotia. Participants were eligible to participate in this study if they: 1) were hospitalized for a heart event (e.g., acute myocardial infarction, coronary artery bypass surgery, or percutaneous coronary intervention); 2) were 19 years of age or older; 3) declined to participate in CR; and 4) were able to read and write in English. Participants were excluded if they had

contraindications to exercise (i.e., unstable angina, uncontrolled cardiac arrhythmias, uncontrolled diabetes, or chronic infections). Participants were approached prior to discharge from the hospital.

When potential participants were approached at the hospital, a verbal description of the study was given, and those who agreed to participate were asked to sign an informed consent. In actuality, as this NSHRF-funded project was already underway before this thesis research began, baseline in-hospital recruitment had already been completed. Participants in Part B received their first body image addendum in their 9-month follow-up mail out, and again at their 12-month follow-up after hospitalization (see Figure 2, p. 20).

All questionnaires for Part B were sent to participants through the mail two weeks prior to each measurement occasion, along with a stamped and addressed return envelope. As in Part A, reminder post cards and full questionnaire packages were resent if necessary, and stamped return envelopes, personalized cover letters with original signatures, coloured paper, university sponsorship, and assurances of confidentiality were used to help increase response rates (Ransdell, 1996).

Measures. Exercise behaviour was measured using the Godin Leisure Time Exercise Questionnaire (LSI: Godin & Shephard, 1985). The LSI instrument consists of three simple open-ended items that measure the frequency of vigorous (e.g., running), moderate (e.g., fast walking), and mild (e.g., easy walking) PA for periods of 10 minutes or more during a typical week. Mild PA was not a variable of interest in this study, as current guidelines for secondary prevention for patients with heart disease suggest an

accumulation of 30 minutes of moderate to vigorous PA at least 5 days per week (Smith et al., 2006). Therefore, for the purposes of this study, only PA variables incorporating moderate and/or vigorous PA were utilized. Days of moderate PA and days of vigorous PA respectively were taken from the raw scores provided by participants, and a third frequency variable, days of moderate and vigorous PA, was calculated by adding the first two. Three PA time variables were also calculated; minutes of moderate PA (days per week x minutes per day of moderate PA), minutes of vigorous PA (days per week x minutes per day of vigorous PA), and total minutes of moderate and vigorous PA (minutes moderate PA + minutes vigorous PA). The LSI has been used frequently in the cardiac population (Blanchard et al., 2002; 2003; 2010), and its reliability and validity compare favourably to 9 other self-report measures of exercise based on various criteria including test-retest scores, objective activity monitors, and fitness indices (Jacobs, Ainsworth, Hartman, & Leon, 1993).

Body image was measured using McKinley and Hyde's Objectified Body Consciousness Scale (OBC; 1996). The OBC consists of a 24-item Likert-type scale, whereby participants rate on a scale of 1 to 7 how much they disagree (low score) or agree (high score) with each statement. Participants may also indicate that a statement does not apply to them. The OBC is comprised of three subscales: body surveillance, body shame, and appearance control beliefs. As mentioned in the literature review, the body surveillance subscale measures the extent to which a person thinks of their body in terms of how it looks, rather than how it feels. The body shame subscale measures whether one feels one is a bad person if one's body does not meet the prescribed cultural ideal. The appearance control belief subscale measures whether a person believes that

with enough effort, they can control the appearance of their body, versus believing that the appearance of their body is largely determined by external factors, such as genetics (McKinley & Hyde, 1996).

To calculate body image, items 1, 3, 4, 6, 7, 9, 20, 21 and 24 of the OBC scales were reversed, and then the scores for the body surveillance (items 1, 3, 7, 9, 14, 16, 18 and 20), body shame (items 2, 5, 8, 11, 13, 15, 17 and 22), and appearance control belief (items 4, 6, 10, 12, 19, 21, 23 and 24) subscales were each summed separately (McKinley & Hyde, 1996). Next, as per the authors' instructions, the score for each scale was divided by the number of responses; "NA" responses and missing responses are not counted. If more than two items were missing from any scale, that scale was counted as missing (McKinley & Hyde, 1996). The OBC subscales have demonstrated good test-retest reliability (ranging from .73 for appearance control beliefs to .79 for body surveillance and body shame, $p < .001$), good construct validity, and have been used with samples of adult men and women (McKinley & Hyde, 1996; McKinley, 1998; McKinley, 1999; John & Ebbeck, 2008).

Reliability of OBC scale – Part A

To determine the reliability of the OBC scale in people with heart disease participating in CR, Cronbach's alpha values were calculated for each 8-item subscale. It was determined that item 15 on the OBC scale, "I never worry that something is wrong with me when I am not exercising as much as I should," harmed the reliability of the body shame subscale at both T1 and T2, and so it was removed. Upon removal of item 15, Cronbach's alpha values for the body shame subscale improved from .582 to .662 at

T1, and from .646 to .660 at T2. Complete Cronbach's alpha values for each body image subscale, incorporating the removal of item 15, are indicated in Table 1.

Table 1

Reliability Analysis of Body Image Subscales for People in CR

	Cronbach's Alpha Values	
	T1 (baseline)	T2 (end of CR)
Surveillance Subscale	.746	.644
Body Shame Subscale	.622	.660
Control Beliefs Subscale	.640	.719

Reliability of OBC scale – Part B

To determine the reliability of the OBC scale in people living with heart disease who do not attend CR, Cronbach's alpha values were again calculated for each 8-item subscale. The original reliability analysis, including all items, is presented in Table 2 (next page). It was determined that items 10 (I think a person can look pretty much how they want to if they are willing to work at it), 13 (even when I can't control my weight, I think I'm a good person), and 14 (during the day, I think about how I look many times) harmed the reliability of their respective OBC subscales, and so they were removed. The resulting Cronbach's alpha values for each body image subscale with these items removed are indicated in Table 3 (next page).

Table 2

Reliability Analysis of Body Image Subscales for People Not in CR – All Items

	Cronbach's Alpha Values	
	T1 (9 months post-hospitalization)	T2 (12 months post-hospitalization)
Surveillance Subscale	.590	.790
Body Shame Subscale	.606	.578
Control Beliefs Subscale	.662	.542

Table 3

Reliability Analysis of Body Image Subscales for People Not in CR – Items 10, 13 and 14 Removed

	Cronbach's Alpha Values	
	T1 (9 months post-hospitalization)	T2 (12 months post-hospitalization)
Surveillance Subscale	.650	.765
Body Shame Subscale	.590	.667
Control Beliefs Subscale	.664	.613

The reliability of the OBC subscales in this population will be addressed in further detail in the Discussion. All statistics for this research, including reliability analyses, descriptive statistics, repeated measures ANOVAs, and regression, were run using SPSS version 15.0.

CHAPTER 5: RESULTS

Part A: People Participating in CR

Descriptive statistics. A total of 31 heart patients attending CR participated in Part A of this study. Patients were largely male (61.3%), ranging in age from 52 to 90 years (mean = 63.7), with an average of 13.1 years of education (SD = 2.6). Of the 31 participants, 29 reported themselves as Caucasian (93.5%), one as South Asian, (3.2%), and one did not report their ethnicity. Most were married (71.0%), and were retired from the workforce (54.8%). The average BMI of this sample was 28.6 (SD = 5.4), which is classified as overweight (WHO, 2000).

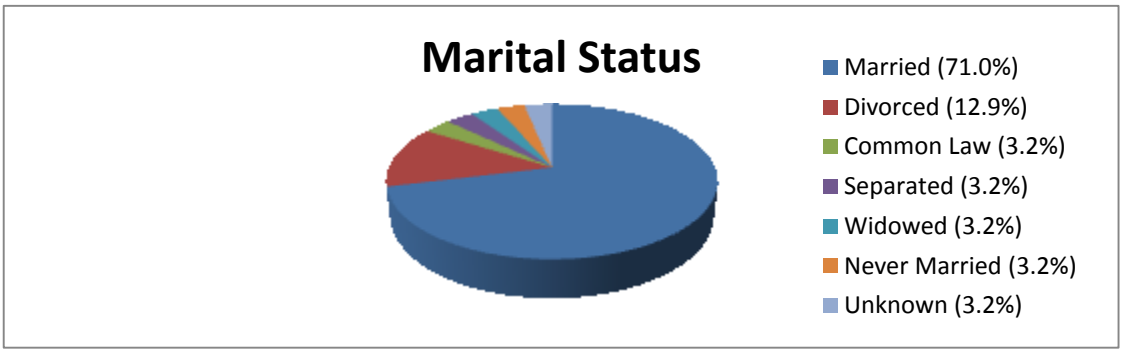

Figure 3. Marital status of people in CR

Figure 4. Employment status of people in CR

Of the 31 participants that completed the study, 31 pairs of longitudinal data were available for the Surveillance and Control Beliefs subscales, while 30 pairs were available for the Body Shame subscale. This is because subscales with fewer than 6 of 8 items completed were dropped (McKinley & Hyde, 1996). The three OBC subscales, three PA frequency variables (number of days of moderate PA, vigorous PA, and moderate + vigorous PA) and three PA time variables (total minutes of moderate PA, vigorous PA, and moderate + vigorous PA) were checked for skewness and kurtosis of greater than 1.96. Three outliers were found in the PA variables (total minutes of vigorous PA only at both T1 and T2, and total minutes of moderate + vigorous PA at T2); these were adjusted accordingly (3.29 x standard deviation + mean; Pagano, 2001). Demographic variables were checked for potential confounds with body image and physical activity, and none were found.

As the body shame subscale was reduced to 7 items, 5 out of 7 items were required for a valid score, instead of the usual 6 out of 8 (McKinley & Hyde, 1996). With item 15 removed, the mean scores (along with standard deviations and ranges) for each body image subscale at each time point are indicated in Table 4 below.

Table 4

Mean Scores of the OBC Subscales for People in CR

	T1 (Baseline)		**T2 (End of CR)**	
	Mean	SD	Mean	SD
Surveillance Subscale	3.53	1.06	3.52	1.00
Body Shame Subscale	2.72	.97	2.68	1.06
Control Beliefs Subscale	5.20	.87	5.08	.91

Means, standard deviations and ranges of all PA variables are indicated in Tables 5 and 6 below.

Table 5

Mean Total Time (in Minutes) of PA for People in CR

	T1 (Baseline)		**T2 (End of CR)**	
	Mean	SD	Mean	SD
Minutes of Moderate PA	358.33	410.09	335.97	338.57
Minutes of Vigorous PA	135.19	236.75	333.81	669.93
Minutes of Moderate + Vigorous PA	500.00	586.65	676.36	873.73

Table 6

Mean Total Frequency (in Days) of PA for People in CR

	T1 (Baseline)		**T2 (End of CR)**	
	Mean	SD	Mean	SD
Days of Moderate PA	3.27	2.08	3.23	2.00
Days of Vigorous PA	1.43	1.89	2.81	1.99
Days of Moderate + Vigorous PA	4.70	2.91	6.03	3.33

Objective #1 – Prevalence of body image issues. In order to determine the prevalence of body image disturbances in people living with heart disease who attend CR, the OBC subscale scores were first split into three groups. With possible scores ranging from 1.00 to 7.00, scores of 1.00-2.99 were categorized as lower, 3.00-5.00 as

medium, and 5.01-7.00 as higher. Descriptive statistics were run to determine the number and percentage of participants who fell into each group.

For the surveillance and body shame subscales, higher scores would indicate a more 'negative' body image. That is, a person who scores highly on the surveillance scale frequently watches their appearance, and thinks about their body in terms of how it looks, rather than how it feels; a person with a higher body shame score feels like they are a bad person if they do not fulfill cultural expectations for their body. In contrast, for the control beliefs subscale, a lower score would indicate a more negative body image – a lower scorer believes that they do not control their weight or appearance, and that these are controlled by outside factors such as heredity (McKinley & Hyde, 1996). The distribution of lower, medium, and higher body image scores at each time point are provided in Table 7 below.

Table 7

Distribution of Body Image Scores for People in CR

	T1 (baseline)			**T2 (end of CR)**		
	Lower	Medium	Higher	Lower	Medium	Higher
Surveillance Subscale	25.8% N = 8	71.0% N = 22	3.2% N = 1	22.6% N = 7	67.7% N = 21	9.7% N = 3
Body Shame Subscale	66.7% N = 20	33.3% N = 10	0% N = 0	58.1% N = 18	38.7% N = 12	3.2% N = 1
Control Beliefs Subscale	3.2% N = 1	38.7% N = 12	58.1% N = 18	0% N = 0	51.6% N = 16	48.4% N = 15

Note: Scores of 1.00-2.99 = lower; 3.00-5.00 = medium; 5.01-7.00 = higher.

As can be seen in Table 7, 3.2% of participants had higher body surveillances scores at T1, versus 9.7% at T2. No participants fell into the higher category for body shame at baseline, while 3.2% did at the end of CR. For control beliefs, 3.2% fell into the lower category at T1, versus 0% at T2.

Objective #2: Stability/change in body image over time. Repeated measures ANOVAs were run with body image scores at T1 and T2, to determine whether body image changed over time. For the Surveillance subscale, Wilk's lambda was .100, F = .001, p = .971, partial eta squared = .000. For the Body Shame subscale, Wilk's lambda was equal to .999, F =.021, p =.887, partial eta squared = .001. Finally, for Control Beliefs, Wilk's lambda was .980, F = .604, p = .443, partial eta squared = .020. These results would indicate no significant change in body image over time in people attending CR.

Objective #3: PA predicting body image. To determine whether PA predicted body image in people participating in CR, body image (i.e., each OBC subscale) at T2 was regressed onto PA at T1. As was mentioned in the Preliminary Analyses section, PA was calculated a number of ways, including total minutes of moderate PA only, total minutes of vigorous PA only, total minutes of moderate and vigorous PA, as well as days of moderate PA, days of vigorous PA, and total days of moderate and vigorous PA. Regression tables with all PA time (in minutes; Table 8) and frequency (in days; Table 9) variables are included on pages 32 and 33, respectively.

Total minutes of moderate PA at T1 significantly predicted body shame at T2, with β = -.372, t = -2.12, p = .043, and also explained a significant proportion of variance in T2 body shame, with R^2 = .138, F = 4.50, p = .043. Marginally non-significant trends were also found with total minutes of moderate PA at T1 predicting control beliefs at T2 (β = .349, t = 1.97, p = .058), and total minutes of moderate and vigorous PA at T1 predicting body shame at T2 (β = -.333, t = -1.87, p = .072, Table 8). No significant relationships were found between days of PA at T1 and body image at T2 (Table 9).

Table 8

Linear Regressions of Minutes of PA Predicting Body Image for People in CR

	T2 body image regressed onto T1 minutes of moderate PA				**T2 body image regressed onto T1 minutes of vigorous PA**				**T2 body image regressed onto T1 minutes of moderate + vigorous PA**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	3.38	.155	.024	.413	3.54	-.044	.002	.817	3.45	.074	.005	.699
Body Shame Subscale	2.96	-.372	.138	.043	2.71	-.135	.018	.476	2.92	-.333	.111	.072
Control Beliefs Subscale	4.76	.349	.122	.058	5.01	.029	.001	.878	4.84	.259	.067	.167

Table 9

Linear Regressions of Days of PA Predicting Body Image for People in CR

	T2 body image regressed onto T1 days of moderate PA				**T2 body image regressed onto T1 days of vigorous PA**				**T2 body image regressed onto T1 days of moderate + vigorous PA**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	3.38	.087	.008	.646	3.46	.071	.005	.711	3.34	.108	.012	.569
Body Shame Subscale	3.05	-.261	.068	.164	2.53	.127	.016	.504	2.80	-.104	.011	.584
Control Beliefs Subscale	4.72	.223	.050	.235	5.07	-.062	.004	.745	4.86	.120	.014	.529

Objective #4: Body image predicting PA. To determine whether body image predicts PA in people attending CR, a series of regressions was performed, whereby T2 PA (i.e., each of the six PA variables at T2) was regressed onto T1 body image (i.e., each of the OBC subscales at T1). Body image at T1 was not found to significantly predict PA time or frequency at T2 (Tables 10 and 11).

Table 10

Linear Regressions of Body Image Predicting Minutes of PA for People in CR

	T2 minutes of moderate PA regressed onto T1 body image				**T2 minutes of vigorous PA regressed onto T1 body image**				**T2 minutes of moderate + vigorous PA regressed onto T1 body image**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	427.7	-.082	.007	.662	698.8	-.164	.027	.377	1146.9	-.162	.026	.383
Body Shame Subscale	403.0	-.072	.005	.704	681.8	-.183	.034	.332	1100.4	-.172	.030	.363
Control Beliefs Subscale	-210.5	.269	.073	.143	-156.6	.122	.015	.513	-356.8	.197	.039	.287

Table 11

Linear Regressions of Body Image Predicting Days of PA for People in CR

	T2 days of moderate PA regressed onto T1 body image				**T2 days of vigorous PA regressed onto T1 body image**				**T2 days of moderate + vigorous PA regressed onto T1 body image**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	4.31	-.164	.027	.379	4.27	-.222	.049	.230	8.58	-.231	.053	.212
Body Shame Subscale	2.72	.072	.005	.707	3.80	-.217	.047	.250	6.52	-.088	.008	.643
Control Beliefs Subscale	3.91	-.057	.003	.761	1.76	.088	.008	.638	5.66	.018	.000	.922

Part B: People Not Participating in CR

Descriptive statistics. A total of 28 heart patients not attending CR participated in Part B of this study. Participants were mostly male (64.3%), ranging in age from 43 to 82 years old (mean age = 66.93), with an average of 12.8 years of education (SD = 3.6). Of the 28 participants, 26 self-identified as Caucasian (96.3%), one as North American Aboriginal (3.6%), and one did not declare their ethnicity. Most participants were married (67.9%), and were retired (67.9%). The average BMI of the participants was 27.5 (SD = 4.2), which is classified as overweight (WHO, 2000).

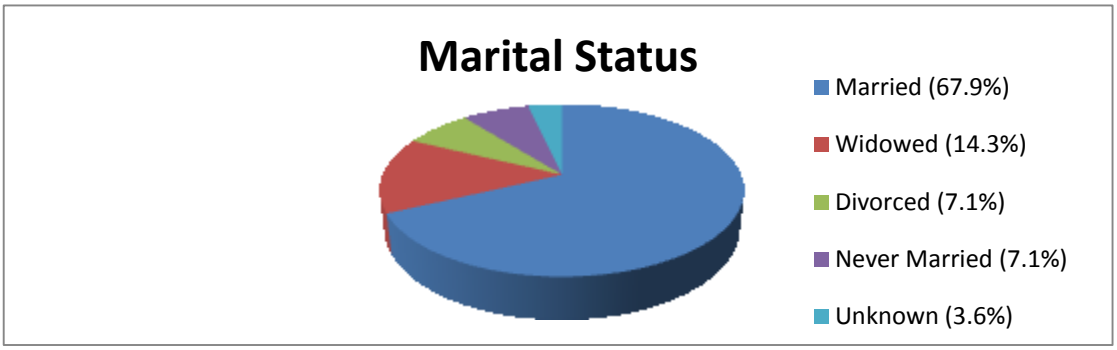

Figure 5. Marital status of people not in CR

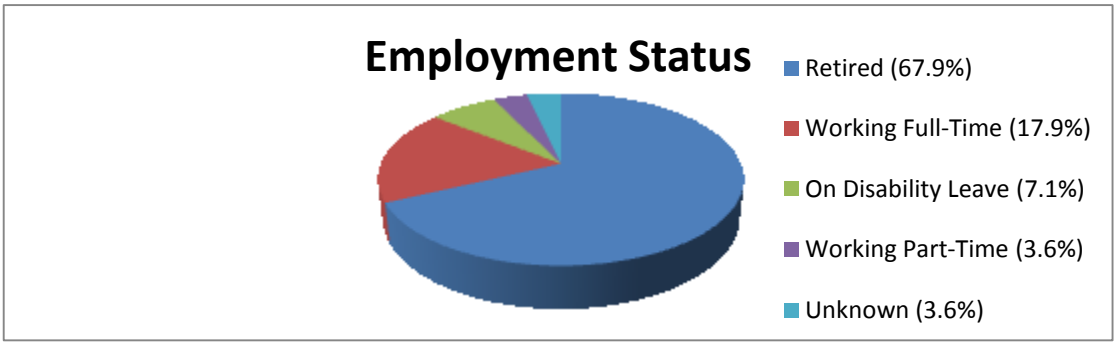

Figure 6. Employment status of people not in CR

From the 28 participants that completed Part B, 28 longitudinal pairs were available for the Surveillance subscale, 27 for the Body Shame subscale, and 28 for the Control Beliefs subscale. As was done in Part A, body image subscale scores, and PA frequency (days) and PA time (minutes) variables were checked for skewness and kurtosis. One outlier was found in the total minutes of moderate + vigorous PA at T2; this was adjusted accordingly (Pagano, 2001). A search for potential confounds of the body image/PA relationship revealed none. However, age was found to be correlated with control beliefs at both T1 ($r = -.653$, $p < .001$) and T2 ($r = -.461$, $p = .015$).

As the surveillance, body shame, and control beliefs subscales were all reduced to 7 items, 5 out of 7 items were required for a valid score, instead of the usual 6 out of 8

(McKinley & Hyde, 1996). With items 10, 13 and 14 removed, the mean scores for each body image subscale at each time point are indicated in Table 12.

Table 12

Mean Scores of the OBC Subscales for People Not in CR

	T1 (9 months post-hospitalization)		**T2 (12 months post-hospitalization)**	
	Mean	SD	Mean	SD
Surveillance Subscale	3.72	1.08	3.27	1.27
Body Shame Subscale	2.69	1.04	2.86	1.08
Control Beliefs Subscale	4.93	1.15	4.52	1.09

The means, standard deviations, and ranges for all six PA variables for people not attending CR are indicated in Tables 13 and 14.

Table 13

Mean Total Time (in Minutes) of PA for People Not in CR

	T1 (9 months post-hospitalization)		**T2 (12 months post-hospitalization)**	
	Mean	SD	Mean	SD
Minutes of Moderate PA	386.85	518.74	308.57	517.86
Minutes of Vigorous PA	40.93	85.24	63.57	161.50
Minutes of Moderate + Vigorous PA	427.78	549.92	362.48	534.03

Table 14

Mean Total Frequency (in Days) of PA for People Not in CR

	T1 (9 months post-hospitalization)		**T2 (12 months post-hospitalization)**	
	Mean	SD	Mean	SD
Days of Moderate PA	4.30	2.54	3.68	2.55
Days of Vigorous PA	1.59	2.19	1.54	2.03
Days of Moderate + Vigorous PA	5.89	4.08	5.21	3.77

Objective #1: Prevalence of body image issues. As was done in Part A, each body image scale was split into three equal groups, with scores of 1.00 – 2.99 categorized as lower, 3.00 – 5.00 as medium, and 5.01 – 7.00 as higher. Similarly, for the surveillance and body shame subscales, higher scores indicate a more negative body image, while for the control beliefs subscale, lower scores indicate a more negative body image. The distribution of lower, medium, and higher body image scores at each time point are provided in Table 15 (next page).

Table 15

Distribution of Body Image Scores for People Not in CR

	T1 (9 months post-hospitalization)			T2 (12 months post-hospitalization)		
	Lower	Medium	Higher	Lower	Medium	Higher
Surveillance Subscale	21.4% N = 6	67.9% N = 19	10.7% N = 3	32.1% N = 9	60.7% N = 17	7.1% N = 2
Body Shame Subscale	66.7% N = 18	29.6% N = 8	3.7% N = 1	55.6% N = 15	44.4% N = 12	0% N = 0
Control Beliefs Subscale	7.1% N = 2	35.7% N = 10	57.1% N = 16	3.6% N = 1	67.9% N = 19	28.6% N = 8

Scores of 1.00-2.99 = lower; 3.00-5.00 = medium; 5.01-7.00 = higher.

As can be seen, 10.7% of participants had higher body surveillances scores at T1, versus 7.1% at T2. For the body shame subscale, 3.7% of participants scored in the higher range at T1, compared to 0% at T2. At T1, 7.1% of participants had lower control beliefs, versus 3.6% at T2.

Objective #2: Stability/change in body image over time.

As was done in Part A, repeated measures ANOVAs were run between body image scores at T1 and T2, to determine whether body image changed over time. For the surveillance subscale, a significant difference in T1 and T2 body image was found, with Wilk's lambda = .768, F = 8.15, p = .008, partial eta squared = .232. For the body shame subscale, Wilk's lambda = .962, F = .98, p = .332, partial eta squared = .038. Finally, for the control beliefs subscale, a significant relationship was also found, with Wilk's lambda = .837, F = 5.28, p = .030, partial eta squared = .163. These results suggest that both body surveillance and control beliefs do change over time in people not attending CR.

Objective #3: PA predicting body image. To determine whether PA predicts body image in people not attending CR, body image at T2 was regressed onto PA at T1, as was done in Part A. No significant relationships were found between either minutes (Table 16) or days (Table 17) of PA at T1 and the OBC subscales at T2; PA did not predict future body image in this population.

Table 16

Linear Regressions of Minutes of PA Predicting Body Image for People Not in CR

	T2 body image regressed onto T1 minutes of moderate PA				**T2 body image regressed onto T1 minutes of vigorous PA**				**T2 body image regressed onto T1 minutes of moderate + vigorous PA**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	3.42	-.186	.034	.354	3.37	-.214	.046	.283	3.45	-.208	.043	.297
Body Shame Subscale	2.87	-.103	.011	.617	2.84	-.101	.010	.624	2.88	-.112	.013	.584
Control Beliefs Subscale	4.54	.014	.000	.946	4.56	-.017	.000	.932	4.55	.010	.000	.960

Table 17

Linear Regressions of Days of PA Predicting Body Image for People Not in CR

	T2 body image regressed onto T1 days of moderate PA				**T2 body image regressed onto T1 days of vigorous PA**				**T2 body image regressed onto T1 days of moderate + vigorous PA**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	3.46	-.103	.011	.608	3.17	.075	.006	.710	3.28	-.024	.001	.905
Body Shame Subscale	3.28	-.279	.078	.167	2.80	-.006	.000	.976	3.06	-.179	.032	.382
Control Beliefs Subscale	4.54	.009	.000	.964	4.55	.009	.000	.965	4.54	.010	.000	.959

Objective #4 – Body image predicting PA. To determine whether body image predicts PA in people not attending CR, T2 PA was regressed onto T1 body image for each of the PA variables and OBC subscales. Control beliefs at T1 significantly predicted minutes of moderate PA at T2, $\beta = .384$, $t = 2.12$, $p = .044$; control beliefs also explained 14.7% of the variance in minutes of moderate PA at T2 (Table 18). A notable, though non-significant trend was also found with control beliefs at T1 predicting total minutes of moderate and vigorous PA at T2 ($\beta = .337$, $t = 1.83$, $p = .079$, Table 18). No significant relationships were found between body image at T1 and days of PA at T2 (Table 19, p. 41).

Table 18

Linear Regressions of Body Image Predicting Minutes of PA for People Not in CR

	T2 minutes of moderate PA regressed onto T1 body image				**T2 minutes of vigorous PA regressed onto T1 body image**				**T2 minutes of moderate + vigorous PA regressed onto T1 body image**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	247.9	.034	.001	.864	145.7	-.147	.022	.455	397.6	-.019	.000	.924
Body Shame Subscale	660.6	-.266	.071	.179	147.1	-.191	.037	.339	765.2	-.292	.086	.139
Control Beliefs Subscale	-542.0	.384	.147	.044	67.0	-.005	.000	.980	-407.7	.337	.114	.079

Table 19

Linear Regressions of Body Image Predicting Days of PA for People Not in CR

	T2 days of moderate PA regressed onto T1 body image				**T2 days of vigorous PA regressed onto T1 body image**				**T2 days of moderate + vigorous PA regressed onto T1 body image**			
	B	β	R^2	p	B	β	R^2	p	B	β	R^2	p
Surveillance Subscale	5.86	-.246	.061	.206	1.74	-.029	.001	.883	7.60	-.182	.033	.353
Body Shame Subscale	4.47	-.140	.020	.485	1.54	.010	.000	.960	6.01	-.087	.008	.667
Control Beliefs Subscale	2.47	.110	.012	.576	1.68	-.016	.000	.935	4.15	.066	.004	.738

CHAPTER 6: DISCUSSION

While well-studied in non-diseased populations (Hausenblas & Fallon, 2006; Reel et al., 2007), very little is known about body image and its relationship with PA in people living with heart disease. It is important to develop a better understanding of the bidirectional relationship between PA and body in this population for a number of reasons. If PA predicts body image in people living with heart disease, then this information could be relayed to heart patients as yet another benefit of being physically active – not only will their physical health improve, but also they will feel better about themselves and their bodies. In addition, it is particularly important to determine whether poor body image could be a barrier to engaging in PA (i.e., whether body image predicts PA) in people living with heart disease, as increasing one's exercise capacity through sufficient PA is one of the strongest predictors of longevity in cardiac patients (Myers et al., 2002). Hence, the purpose of this thesis research was to address this current gap in the literature on heart patients, and to determine: (1) the prevalence of body image issues, (2) whether body image changed over time, (3) whether PA predicted body image, and (4) whether body image predicted PA in heart patients who attended, and did not attend, CR.

Objective #1

Based on the prevalence of body image concerns in non-diseased populations, it was hypothesized that approximately 20% of people living with heart disease would report body image issues (Garner, 1997; Kruger, Lee, Ainsworth & Macera, 2008). The actual percentage of heart patients reporting body concerns was lower than predicted. For those participating in CR, 3.2-9.7% reported higher body surveillance (a score of 5.01-

7.00), 0-3.2% reported higher body shame, and 0-3.2% reported lower appearance control beliefs (a score of 1.00-2.99). For those not participating in CR, 7.1-10.7% had higher body surveillance, 0-3.7% had higher body shame, and 3.6-7.1% had lower control beliefs.

There are several reasons why body image concerns may have been lower than expected in people living with heart disease. For one, there were more males than females participating in both Part A (people participating in CR) and Part B (people not participating in CR) of this study; samples were 61.3% and 64.3% male respectively. In non-clinical populations, men have consistently reported lower body image concerns than women (Garner, 1997). For example, Kruger and colleagues (2008) found that 12.5% of men and 23.6% of women reported not being satisfied with their current body size. It is thus conceivable that the men in our sample pulled the overall average of body image concerns down. However, upon closer inspection, this does not appear to be the case. Mean OBC body image scores stratified by gender for people participating in CR (Part A) and people not participating in CR (Part B) are indicated in Tables 20 and 21.

Table 20

Means OBC Scores by Gender for People Participating in CR (Part A)

	T1 Body Surveillance Score	**T2 Body Surveillance Score**	**T1 Body Shame Score**	**T2 Body Shame Score**	**T1 Control Beliefs Score**	**T2 Control Beliefs Score**
Men	3.33 (N = 19)	3.38 (N = 19)	2.77 (N = 19)	2.54 (N = 19)	5.11 (N = 19)	5.18 (N = 19)
Women	3.83 (N = 12)	3.74 (N =12)	2.62 (N = 11)	2.91 (N = 12)	5.36 (N = 12)	4.93 (N = 12)

Table 21

Mean OBC Scores by Gender for People Not Participating in CR (Part B)

	T1 Body Surveillance Score	T2 Body Surveillance Score	T1 Body Shame Score	T2 Body Shame Score	T1 Control Beliefs Score	T2 Control Beliefs Score
Men	3.57 (N = 18)	3.18 (N = 18)	2.71 (N = 17)	2.94 (N = 17)	4.98 (N = 18)	4.41 (N = 18)
Women	3.99 (N = 10)	3.43 (N =10)	2.64 (N = 10)	2.71 (N = 10)	4.84 (N = 10)	4.71 (N = 10)

Independent samples t-tests (not shown) revealed that any differences in mean body image scores for men and women were not statistically significant, for all OBC subscales at both time points, for both people participating in CR, and those not participating in CR. Notably, however, women do consistently report higher average body surveillance scores than men for both time points in both Part A (CR) and Part B (no CR). While this statistically non-significant trend must be interpreted with caution, it is consistent with objectification theory (Fredrickson & Roberts, 1997). Objectification theory posits that girls and women in Western cultures learn to internalize an observer's perspective as a primary view of their physical selves, and to assess their own value as a function of how they believe their bodies are perceived by others. This perspective can lead to perpetual self-monitoring (i.e., body surveillance), which the women in our study appear to be engaging in more so than the men (Fredrickson & Roberts, 1997).

Another potential explanation for the lower than expected body image concerns could be the specificity of the OBC subscales. Unlike the larger survey studies reported earlier (e.g., Kruger et al., 2008), this study did not simply ask participants if they were satisfied with their current body size. Kruger and colleagues (2008) gauged their

participants' *body dissatisfaction*, or displeasure with one's weight and/or shape, a general form of body image concern (Thompson et al., 1999). McKinley and Hyde's (1996) body surveillance, body shame, and appearance control beliefs, as measured in this study, are more specific forms of body image concerns. Body surveillance is the extent to which a person thinks of their body in terms of how it looks, rather than how it feels. Body shame is the extent to which one feels one is a bad person if one's body does not meet the cultural ideal. Appearance control beliefs are the extent to which a person believes that with enough effort, they can control the appearance of their body, versus believing that the appearance of their body is largely determined by external factors, such as genetics (McKinley & Hyde, 1996). Unfortunately, there is little data available on the percentage of people with 'higher' or 'lower' body image concerns as measured by the OBC subscales, as the scales are not typically used in this way. The authors indicate that no official cut-points for higher or lower scorers currently exist (McKinley & Hyde, 1996). However, the OBC scale has been used to study the relationship between body image and PA (Greenleaf, 2005; John & Ebbeck, 2008; Lowery et al., 2005; Sinclair & Myers, 2004), and thus was chosen for this study largely due to its suitability for addressing Objectives #3 and #4.

The OBC scale has its roots in feminist theory (Bartky, 1988; Spitzack, 1990), and was originally designed and validated for use with women (McKinley & Hyde, 1996). While it has since been used to investigate the relationship between body image and PA in both men and women (John & Ebbeck, 2008; Lowery et al., 2005), there may well be components of a man's body experience that the OBC scale simply does not tap into. For example, previous research in populations with chronic illnesses has identified

the importance of a person's sense of competence, or functional capacity, to their body image (Hurd Clarke & Griffin, 2008). Sexual function is one component of this perceived functional capacity, and many men suffering from diabetes, hypertension, or who have had a heart attack may experience sexual dysfunction (Fairburn et al., 1982; Papadopoulos, 1990). This component of a man's body experience would not be captured by the OBC scale. Further qualitative study of people living with heart disease could help to determine which components of body image are most relevant to them.

Another possibility, of course, is that body image concerns are indeed lower in people living with heart disease than in the general population. A comparison of the mean OBC subscale scores from people in CR (Part A) and people not in CR (Part B) with the mean OBC scores of other populations studied would suggest that body image concerns are generally lower in people living with heart disease than in non-diseased populations (John & Ebbeck, 2008; McKinley, 1998; 1999; McKinley & Hyde, 1996).

Table 22

Mean OBC Subscale Scores for Select Populations

	People Participating in CR (Part A)	**People Not Participating in CR (Part B)**	**Undergraduate Women[1,2,3,4]**	**Undergraduate Men[2,4]**	**Middle-Aged Women[3]**
	Range of mean scores	Range of mean scores	Range of mean scores	Range of mean scores	Mean Score
Surveillance Scale	3.52-3.53	3.27-3.72	4.22-4.91	3.80-4.38	4.33
Body Shame Scale	2.68-2.72	2.69-2.86	3.25-3.49	2.78-2.80	2.98
Control Beliefs Scale	5.08-5.20	4.52-4.93	3.93-4.94	4.65-5.06	4.94

[1] McKinley & Hyde (1996)
[2] McKinley (1998)
[3] McKinley (1999)
[4] John & Ebbeck (2008)

As can be seen in Table 22, both people participating in CR and not participating in CR had lower body surveillance scores (i.e., more positive body image) on average than samples of undergraduate women, undergraduate men, and the middle-aged women (John & Ebbeck, 2008; McKinley, 1998; 1999; McKinley & Hyde, 1996). Both people in CR and not in CR had lower body shame on average than samples of undergraduate and middle-aged women, and body shame lower than or similar to samples of undergraduate men (John & Ebbeck, 2008; McKinley, 1998; 1999; McKinley & Hyde, 1996). People participating in CR had higher average control beliefs (i.e., more positive body image) than all three non-clinical populations, and people not participating in CR had a range of average scores that overlapped with those of undergraduate women and men, and middle-aged women (John & Ebbeck, 2008; McKinley, 1998; 1999; McKinley & Hyde, 1996). In sum, with the exception of control beliefs for people not in CR (Part B), people living with heart disease on average appear to have more positive body image scores on the OBC subscales than non-diseased populations.

This may not be surprising, however. For example, if a person has recently had a heart event and has experienced a significant health scare, perhaps they may have come to the conclusion that there are more important things to worry about than how others perceive their appearance, or whether or not their body is meeting a near impossible cultural ideal. There is some evidence to suggest that attention to one's appearance declines when serious health issues arise (Hurd Clarke, 2002). In addition, for those who are physically active, their reasons for engaging in PA may be more health- (e.g., exercising to strengthen the heart muscle, and to prevent future reoccurrences) than

appearance-related. A number of studies have found that engaging in PA for health as opposed to solely for appearance-related reasons is related to more positive body image (LePage & Crowther, 2010; McDonald & Thompson, 1992; Strelan & Hargreaves, 2005; Strelan, Mehaffey, & Tiggemann, 2003).

Objective #2

The second objective of this study was to determine if body image was stable or changed over time in people living with heart disease. It was hypothesized that for participants in Part A completing CR (which includes a PA intervention), body image would improve over time; that is, body image at the end of CR (T2) would be more positive than body image at the beginning of CR three months earlier (T1). Contrary to this hypothesis, body image as measured by all three OBC subscales did not significantly change between baseline and the end of CR for participants completing CR (Part A). Further inspection of the partial eta squares revealed only a small effect size (whereby an η^2 of .01 = small, .06 = medium, and .14 = large) for control beliefs, while the effect sizes for body surveillance and body shame were negligible (Cohen, 1988; Stevens, 1996).

The stability of body image over time in people attending CR was unexpected, as these participants were attending regular PA sessions through CR and were essentially receiving a PA intervention. A large number of studies in non-diseased populations have found that in general, engaging in PA positively influences body image; as PA increases, so too, typically, does body image (see Hausenblas & Fallon, 2006, and Reel et al., 2007, for meta-analyses). However, it is interesting to note that while the average number of minutes of vigorous PA increased, minutes of moderate PA did not increase between

baseline and the end of CR. Perhaps moderate PA is more strongly related to improved body image in this population than vigorous PA. In adults without heart disease, a subset of people who engage in PA at very high intensity and frequency compared with others in their age group (i.e., over-exercisers) actually display more negative body image than those who engage in PA of more moderate intensity and frequency (Davis, 2000; Markula, 1995). If moderate PA in particular is associated with positive body image in people who attend CR, then it is actually no surprise that body image was stable over time, as minutes of moderate PA did not increase between baseline and the end of CR.

Another possible explanation has to do with the timing of recruitment for people participating in CR (Part A). Participants were generally recruited during their second or third week of CR, in order to allow them time to become comfortable with the program, and to allow CR program staff time and space to set guidelines and explain procedure to participants without hindrance. It is possible that by the third week of CR, participants' PA levels may already have increased from what they were before the program began, in turn possibly boosting T1 ('beginning' of CR) body image scores from what they would have been pre-PA intervention. Participants may not have been assessed early enough to capture the true range of change in body image.

For participants not completing CR (Part B), it was hypothesized that body image would remain stable between T1 (9 months post-hospitalization) and T2 (12 months post-hospitalization). In fact, contrary to this hypothesis, both body surveillance and control beliefs were significantly different at 12 months than they were at 9 months post-hospitalization. Partial eta squares revealed very large to large effect sizes for the changes in body surveillance ($\eta^2 = .23$) and control beliefs ($\eta^2 = .16$), and a small effect size for

the non-significant change in body shame ($\eta^2 = .04$; Cohen, 1988). Body surveillance increased and control beliefs decreased, both of which indicate a *worsening* in body image over time. More specifically, participants at 12 months post-hospitalization were more likely to frequently watch their appearance, and think about their body in terms of how it looked (OBC body surveillance), and believe that they did not control their weight and appearance and that these were controlled by outside factors such as heredity (OBC control beliefs; McKinley & Hyde, 1996). If moderate PA is related to positive body image in people living with heart disease, as was posited for people enrolled in CR, then it follows that moderate PA would be expected to decrease from 9 months to 12 months post-hospitalization in people not attending CR to coincide with the drop in body image. This is precisely what was observed; people in Part B not attending CR engaged in 387 minutes of moderate PA on average at 9 months post-hospitalization, but this dropped down to 309 minutes at 12 months post-hospitalization.

It is also possible that social support for people living with heart disease who did not attend CR slowly decreased over time. In a sample of 200 Swedish women, 20% indicated that they needed more social support than they actually received from their social network 12 months after a heart attack, up from 17% at 3 months post-heart attack (Hildingh & Fridlund, 1997). As strong social support from loved ones is related to more positive body image, a drop in support for heart patients not attending CR could not only have deleterious health outcomes (Leifheit-Limson et al., 2010), but also have a negative impact on the way participants thought and felt about their respective bodies (Weller & Dziegielewski, 2004; Skomorovski, Matheson, & Anismon, 2006).

Indeed, it is quite concerning that body image worsened over time in people not attending CR. This group is already more vulnerable than those who attend CR in terms of PA levels (Reid et al., 2006). If on top of this they are experiencing deteriorating body image over time, they may also be more susceptible to incidences of depression, heightened anxiety, and lowered self-esteem (Cash, Phillips, Santos, & Hrabosky, 2004; Denniston, Roth, & Gilroy, 1992; Furnham, Badmin, & Sneade, 2002; Grilo, Wilfley, Brownell, & Rodin, 2002; McCreary & Sasse, 2000; Seigel, 2002; Silberstein, Striegel-Moore, Timko, & Rodin, 1988; Stice & Bearman, 2001; Thompson & Altabe, 1991). Clearly, due to the negative implications, worsening body image in people not attending CR is a priority that needs to be further investigated and addressed.

Objective #3

The third objective of this study was to determine whether PA predicted body image in people living with heart disease. It was hypothesized that greater PA levels at T1 (beginning of CR for Part A, 9 months post-hospitalization for Part B) would predict more positive body image at T2 (end of CR for Part A, 12 months post-hospitalization for Part B) in both people attending CR, and not attending CR (Arbour & Martin Ginis, 2008). For people attending CR (Part A), consistent with the original hypothesis, PA at baseline was found to predict some components of body image at the end of CR. More specifically, an inverse relationship was found with minutes of moderate PA at baseline predicting body shame at the end of CR; that is, those who were more active at the beginning of CR reported less body shame three months later at the end of CR. With an R^2 of .138, this indicates a medium effect size (whereby $R^2 = .02$ is small, $R^2 = .13$ is

medium, and $R^2 = .26$ is large; Cohen, 1988; Miles & Shevlin, 2004). A marginally non-significant relationship with a medium effect size ($R^2 = .122$) was also found between minutes of moderate PA at T1 and control beliefs at T2; those who were more active at the beginning of CR had higher control beliefs (i.e., believe that they can control their weight and appearance if they try hard enough) at the end of CR. Lowery and colleagues found similar significant relationships between body shame and PA, and control beliefs and PA (2005). Sinclair & Myers (2004) also found a significant relationship between control beliefs and PA. These findings, with increased PA predicting improved body image, are consistent with a large body of research conducted with non-diseased populations (Arbour & Martin Ginis, 2008; Henry et al., 2006; LePage & Crowther, 2010; Reel et al., 2007; Tiggemann & Williamson, 2000).

As touched upon earlier, there appears to be an intensity issue occurring, whereby minutes of moderate PA, but not minutes of vigorous PA, predict certain components of body image. Moderately intense physical activities, such as walking or gardening, are among the most common forms of PA for adults (Crespo, Keteyian, Heath, & Sempos, 1996). In fact, at the beginning of CR, heart patients in Part A of this study (people in CR) on average reported engaging in more than twice as many minutes of moderate PA (358) than minutes of vigorous PA (135) each week. In addition, 10 out of 31 participants reported engaging in some moderate PA, but no vigorous PA at all. Moderate PA appears to be much more attainable than vigorous PA for people attending CR (Hage, Mattson, & Stahle, 2003). Perhaps in part because it is more achievable and its benefits are enjoyed by more people attending CR, moderate PA appears to be a better predictor of improved body image than vigorous PA in this population. In addition, in their review of PA

interventions to improve body image, Martin and Lichtenberger (2002) found that those participants with the poorest initial body image tend to show the greatest increases when increasing their PA levels; the effect size of PA interventions on body image seems to be greater for participants moving from inactivity to light or moderate activity, than from light or moderate activity to vigorous activity. Thus, although vigorous PA has been found to confer the greatest cardioprotective benefits to people living with heart disease (Swain & Franklin, 2006), moderate PA has still been found to have positive health effects (Jeon, Lokken, Hu, & van Dam, 2007; Pate et al., 1995; Thompson et al., 2003), and appears to actually be a better predictor of improved body image in this population.

In contrast, in Part B (people not attending CR), PA at 9 months post-hospitalization did not predict body image at 12 months post-hospitalization. This result is puzzling, as it runs counter to existing literature in non-diseased populations (Hausenblas & Fallon, 2006; Reel et al., 2007). Small effect sizes of R^2 = .034, .046, and .043 were found in the regressions with T2 (12 months post-hospitalization) body surveillance and minutes of moderate, vigorous, and moderate + vigorous minutes of PA respectively, whereby fewer minutes of PA at 9 months post-hospitalization predicted higher body surveillance (i.e., worse body image) at 12 months post-hospitalization. However, none of these relationships reached statistical significance. It is possible that a larger study with more participants and more power would be able to do so.

Alternatively, perhaps some of the body image improvements observed over time in people attending CR (Part A), but not in people who do not participate in CR (Part B), can be partially attributed to social support. In non-diseased populations, increased social support is related to improved body image (McCabe & Ricciardelli, 2003; Paxton, 1996).

For people living with heart disease, a number of studies have found that increased social support is associated with better physical and psychological recovery outcomes after a heart event (Berkman, Leo-Summers, & Horwitz, 1992; Con, Linden, Thompson, & Ignazewski, 1999; Yates, 1995). Perhaps people who attended CR in this study received more social support than those who did not attend CR. Yates (1995) found that in addition to emotional support from a spouse, greater support from and satisfaction with health care providers were also associated with better recovery after cardiac illness. By simply attending their classes, people in CR very likely had more contact with health care providers than those who did not participate in CR, and by proxy received more support and positive reinforcement from the CR program staff. CR participants would also have the opportunity receive support from, and build camaraderie with, their peers concurrently enrolled in CR sessions. These factors in turn may have helped people enrolled in CR to develop more positive body image over time than people who did not participate in CR.

Objective #4

This study's fourth and final objective was to determine if body image predicted PA in people living with heart disease. In this regard, it was hypothesized that more positive body image at T1 (i.e., beginning of CR for Part A, 9 months post-hospitalization for Part B) would predict greater PA at T2 (i.e., end of CR for Part A, 12 months post-hospitalization for Part B) in both people attending CR, and not attending CR (Greenleaf, 2005; Sabiston, 2009). While this hypothesis was not supported for people in CR (Part A), control beliefs at 9 months post-hospitalization did significantly predict minutes of

moderate PA at 12 months post-hospitalization for people not participating in CR (Part B), with a medium effect size of $R^2 = .147$. That is, those people not participating in CR (Part B) with higher control beliefs at 9 months post-hospitalization engaged in more minutes of moderate PA at 12 months post-hospitalization. This is once again consistent with correlational findings on the relationship between control beliefs and PA reported by Sinclair & Myers (2004) and Lowery and colleagues (2005). A person with high appearance control beliefs thinks that with enough effort, they can control many aspects of their body's appearance; they would have an internal locus of control (i.e., believe that they have control over many components of their life) as opposed to external locus of control (i.e., believe that life events are mostly determined by chance, other individuals, or outside factors) regarding the appearance of their body (Rotter, 1966). It does seem logical that those people in our study who believed they could control their body's appearance were more likely to engage in higher levels of (moderate) PA than those who believed their appearance was controlled by external factors.

There appears to be a PA intensity issue at play here as well. For people not participating in CR (Part B), body image at 9 months post-hospitalization (as measured by OBC appearance control beliefs) only predicted PA minutes of moderate intensity at 12 months post hospitalization, but not PA minutes of vigorous intensity. It is conceivable that the sample size was simply not large enough to capture a relationship between control beliefs and vigorous PA, as only 14 of 28 participants in Part B reported engaging in any vigorous PA at T2, versus 21 of 28 reporting any amount of moderate PA. Or, perhaps body image, as measured by the OBC subscales, is simply more strongly associated with PA of moderate intensity than PA of vigorous intensity. For objectives #3

and #4, no significant relationships were found between minutes of vigorous PA and body image in this study, both in people attending CR (Part A), and not attending CR (Part B). Perhaps the relationship between body image and vigorous activity was complicated by a subset of people who engage in excessive PA ('over-exercisers') due to compulsion, guilt, or an obsession with PA for appearance rather than health reasons and have quite negative body image, versus 'healthy exercisers', who would typically experience a direct relationship between body image improvement and increased PA (Fortier & Farrell, 2009; LePage & Crowther, 2010; McDonald & Thompson, 1992). Negative body image may have predicted increased vigorous PA in over-exercisers, and decreased vigorous PA in healthy exercisers, effectively cancelling each other out.

For people participating in CR (Part A), body image at the beginning of CR was not found to predict PA three months later at the end of CR. Perhaps the participants in CR experienced body image differently in a hospital-based, group exercise context, than the participants not in CR did in a home-based, personal exercise context. People not in CR would have had more personal control in planning their exercise, and perhaps this engendered an increased sense of self-efficacy, which translated into more PA (Bandura, 1997; Cromwell & Adams, 2006; Lee, Arthur, & Davis, 2008). Alternatively, perhaps a relationship between body image and PA did exist in people attending CR (Part A), but our study was not powerful enough to detect it. An inspection of the R squares revealed a small to medium effect size of .073 for more positive control beliefs at baseline predicting more minutes of moderate PA at the end of CR (whereby $R^2 = .02$ is small, $R^2 = .13$ is medium, and $R^2 = .26$ is large; Cohen, 1988; Miles & Shevlin, 2004); this relationship, however, was not statistically significant ($p = .143$). Perhaps a higher-

powered study with more participants would have reached significance; this and other limitations to the current study will be discussed in more detail in the section to follow.

Limitations

A major limitation of this study was power. With only 31 participants in Part A and 28 in Part B, I did not have the statistical power to control for gender or any other demographic variables. This is unfortunate, as I am well aware that a relationship exists between body image and gender in non-diseased populations. Although the concept of body image is applicable to both males and females, on average, men report less concern with their bodies than women (Ferraro et al., 2008). According to objectification theory (Fredrickson & Roberts, 1997), girls and women in Western cultures learn to internalize an observer's perspective as a primary view of their physical selves, and to assess their own value as a function of how they believe their bodies are perceived by others. This perspective can lead to perpetual self-monitoring, which in turn increases a woman's opportunities for feeling shame and anxiety with regards to her body (Fredrickson & Roberts, 1997). Consistent with objectification theory, a number of studies have found that women tend to report more body concern and poorer body image than men (Frederick, Peplau, & Lever, 2006; Feingold & Mazzella, 1998; Pliner, Chaiken, & Flett, 1990). For example, researchers using McKinley and Hyde's (1996) OBC scale found that women reported significantly higher levels of body surveillance (viewing one's own body from the perspective of a critical outside observer) and body shame (feeling shame when one's body does not conform to cultural standards) than men (John & Ebbeck, 2008; McKinley, 1998).

In addition, while aerobic training programs have been effective in promoting positive body image changes, a review of the PA-body image literature would suggest that weight training can produce even greater increases in body image (Martin & Lichtenberger, 2002). For example, Henry, Anshel, and Michael (2006) found that in a group of 72 college females followed for 12 weeks, those doing interval circuit training (n = 28) experienced the greatest improvements in overall appearance evaluation, compared to those doing aerobic exercise training (n = 23) and those who did no vigorous PA (control group, n = 21). While anaerobic weight training could potentially benefit people living with heart disease, both in terms of improving strength and body image, most organized CR programs do not include a weight training component, and weight training specifically was not assessed in this study. Studying the relationship between weight training and body image was unfortunately beyond the scope of this current project, but could be an interesting area for future research.

The relatively low reliability of the OBC subscales is another limitation of this study. Most statisticians agree that the reliability of a scale should never fall below .70 (Guilford, 1956; Nunnally, 1978; Kline, 2000). Unfortunately, a number of Cronbach's alpha values for the OBC subscales did not meet this standard, for both people who did attend CR, and those who did not. The low reliability obtained in this current study (Cronbach's alpha ranging from .62 to .75 for people participating in CR, and from .59 to .77 for those not in CR) can partially explained by at least two factors. Firstly, in order to measure internal consistency reliability, all indices must be computed on samples that are sufficiently large in size in order to minimize statistical error. Kline (2000) recommends a minimum of 100 participants to achieve this; unfortunately, only 31 participants were

recruited for Part A of this study, and 28 for Part B. Secondly, the short length of the OBC scale (8 items for each subscale), while making it practical and convenient to administer, is not conducive to strong reliability scores; as Kline argues, "tests of fewer than 10 items are unlikely to be highly reliable" (2000, p. 13). With its low power and the lower than desirable reliability of the OBC subscales, the results of this study must be interpreted with caution. However, the findings of this small study are promising. The standardized betas for PA predicting body shame (β = -.372) and control beliefs (β = .349) and in people in CR, and for control beliefs predicting PA (β = .384) for people not in CR, are very large, even compared to other predictors of PA in heart patients (Blanchard et al., 2002; 2010). These results provide good reason to pursue a larger scale study examining body image and PA in people living with heart disease in the future.

This research was carried out in conjunction with Dr. Chris Blanchard's existing CIHR and NSHRF projects. Because of this, the body image measure had to be kept short, so as not to overburden participants already filling out a relatively long questionnaire. The timeline of my study was also restricted by the timeline of Dr. Blanchard's studies, as has been discussed previously. Additionally, there are a number of limitations associated with survey studies (Shi, 2008). For example, a survey cannot measure actual behaviour; it only measures what people report they do, think, or feel. As such, data accuracy may have been limited by respondents' misinterpretation of questions, inaccurate recall, or even purposeful misrepresentation of facts (Shi, 2008). Participants may also have responded with socially desirable (rather than 100% truthful) answers to survey questions. Finally, the non-experimental design of my study means that it is be limited in explanatory analysis; that is, although I have found that certain

components of body image predict PA (and vice versa) in people living with heart disease, I can not claim causation (Shi, 2008).

Implications and Future Directions

Taking into account the limitations of this research, if the results can be replicated in future studies, a number of practical implications do exist. The fact that increased minutes of moderate PA predicted improved body image (decreased body shame, and increased appearance control beliefs) in the context of a 12-week CR program is a very positive finding. At the end of their three month CR program, participants in this study became more aware that they were still good people even if they did not fulfill unrealistic cultural expectations for their bodies, and felt more like they could control their respective bodies' weight and appearance through their efforts. Health care professionals and CR staff can promote improved body image as yet another benefit of engaging in (moderate intensity) PA, for heart patients who may be considering CR. In contrast, while PA did not predict body image in people not attending CR, this actually provides yet another reason to recommend CR after a heart event. This thesis research suggests that PA undertaken in the context of a CR program can result in more positive changes in body image (i.e., decreased body shame and improved appearance control beliefs) in people living with heart disease than PA undertaken outside of the CR context.

The finding that body image, or more specifically, appearance control beliefs, can predict future PA in people not attending CR may also potentially be very useful. Namely, if one is able to improve a person's appearance control beliefs, one may in turn be able to increase their PA levels. This potential avenue for increasing PA could be of

great importance, because the majority of people living with heart disease do not initiate any formal CR program after being discharged from the hospital (Ades et al., 1992; Balady et al., 1994). As such, this vulnerable group typically reports even lower PA levels and adherence than people who do participate in CR, and as such are at an even higher risk of disease and/or morbidity (Reid et al., 2006). Targeting appearance control beliefs with interventions (e.g., cognitive behavioural therapy, psychoeducational programs, etc.) in this non-CR group could be one way of potentially increasing their PA, and hence improving their longevity and quality of life (Butters & Cash, 1987; Lee et al., 2008; Myers et al., 2002; Springer et al., 1999).

Ideally, future studies could also gather information regarding the prevalence of body image concerns in people living with heart disease, as to my knowledge, very little information exists on this topic (Lichtenberger et al., 2003). A better understanding of the prevalence of body image issues in people living with heart disease could help to clarify the extent of the problem in this population. The fact that body image either remained stable (in people in CR) or decreased over time (in people not in CR) is concerning, and also deserves further study, because of the negative mental and physical health implications associated with poor body image (Cash et al., 2004; Denniston et al., 1992; Furnham et al., 2002; Grilo et al., 2002; McCreary & Sasse, 2000; Seigel, 2002; Silberstein et al., 1988; Stice & Bearman, 2001; Thompson & Altabe, 1991).

It would be important to include a qualitative component in future studies with this population, to gather information on which components of body image are most relevant to people living with heart disease. This could help to clarify whether the OBC scale was an appropriate measure of body image, or whether other components of body

image may be important to capture. The Body Image Quality of Life Inventory (BIQLI; Cash & Fleming, 2002) is one assessment tool that could potentially be appropriate. It allows respondents to report both negative and positive body image effects on self-concept, feelings of masculinity—femininity, social interactions, emotional experience, overall satisfaction with life, sexuality, and a number of other domains.

Ideally, the quantitative component of any follow-up study would recruit a minimum of 100 women and 100 men, and would follow participants for at least three time points over a six month period or longer. This extended longitudinal design would provide information on the stability or change of body image over time, and more data to better understand the bidirectional relationship between PA and body image in people living with heart disease. The increase in power would allow the researcher to look for the potentially moderating effects of gender on the PA/body image relationship, and would also make it possible to control for the effects of other demographic variables. It would also be interesting to include a measure of 'reasons for engaging in PA' in future studies examining PA and body image in people living with heart disease, as this has had an impact on the PA/body image relationship in non-diseased populations, with health related reasons for engaging in PA being associated with more positive body image than solely appearance-based reasons (LePage & Crowther, 2010; McDonald & Thompson, 1992).

In conclusion, if the results of this thesis research can be replicated in studies of larger scale, the findings have the potential to lead to improved policy and programming for people living with heart disease. Heart patients who are considering enrolling in CR could be informed not only of the physical health benefits of engaging in PA, but also of

the psychological benefit of feeling better about their body. For those who express no intention of enrolling in CR, a psychological intervention to improve appearance control beliefs could be developed, to help them to become more physically active. This avenue of research is rich in possibilities, and has the potential to lead to improved longevity and quality of life in people living with heart disease.

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