PREDICTORS OF MAINTENANCE CARDIAC REHABILITATION

SELF-EFFICACY AND OUTCOME SATISFACTION AS PREDICTORS OF ADHERENCE TO MAINTENANCE CARDIAC REHABILITATION IN MEN WITH CORONARY ARTERY DISEASE (CAD)

By

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A Thesis

Submitted to the School of Graduate Studies

in Partial Fulfillment of the Requirements

for the Degree

Master of Science

McMaster University

MASTER OF SCIENCE (2003)
(Human Biodynamics)

McMaster University
Hamilton, Ontario

TITLE: Self-Efficacy and Outcome Satisfaction as Predictors of Adherence to Maintenance Cardiac Rehabilitation in Men with Coronary Artery Disease (CAD).

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NUMBER OF PAGES: x, 116

Abstract

The physiological and psychosocial benefits of sustained exercise adherence among individuals with coronary artery disease (CAD) have been well-documented (e.g., Blumenthal et al., 1997; Rozanski et al., 1999; Wenger et al., 1995). Despite these known benefits, approximately 80% of patients who enter the maintenance phase of cardiac rehabilitation drop out after one year (Balady et al., 1994; Hedback, Perk, Wodlin, 1993). Among this 80%, less than 25% continue to exercise at levels that will maintain or improve cardiorespiratory fitness (Daltroy, 1985; Radtke, 1989). Self-efficacy has been identified as a significant predictor of adherence to exercise beyond the initial 6 months of participation. In addition to self-efficacy, outcome satisfaction has been suggested as a potentially significant predictor of adherence to exercise beyond the initiation phase (i.e., beyond the first 6 months). Unfortunately, most research examining these predictors of adherence has been conducted among asymptomatic populations. Thus, little is known about the predictive utility of self-efficacy and outcome satisfaction in relation to sustained exercise adherence among the CAD population.

The purpose of the present study was to examine self-efficacy (Bandura, 1986) and outcome satisfaction (Rothman, 2000) in the prediction of adherence to maintenance cardiac rehabilitation in 101 men (*M* age = 68.15 $\pm$ 8.03) with coronary artery disease (CAD). A series of three hierarchical multiple regression analyses were conducted to predict onsite, offsite and total adherence to the maintenance cardiac rehabilitation exercise prescription. Interestingly, Exercise Beliefs (i.e., days of aerobic exercise per week believed necessary to maintain cardiovascular health), one of the study covariates,

emerged as an important predictor of both offsite and total exercise adherence and explained a significant amount of variance in these variables ($R^2 = .25$ [offsite], .23 [total], *p*s < .01). As predicted, self-regulatory efficacy was a significant predictor and explained a significant amount of variance in onsite exercise adherence ($R^2 = .17$ [scheduling], $p < .001$). Task self-efficacy was not a significant predictor and did not account for a significant amount of variance in onsite exercise adherence. Also as predicted, task self-efficacy was a significant predictor and explained a significant amount of variance in offsite exercise adherence ($R^2 = .10$, $p < .05$). Self-regulatory efficacy was not a significant predictor and did not account for a significant amount of variance in offsite exercise adherence. In addition, consistent with hypothesis, both task self-efficacy and self-regulatory efficacy were significant predictors of total exercise adherence and explained a significant amount of the variance in this variable ($R^2 = .12$ [task], .07 [scheduling], *p*s < .05). Contrary to hypothesis, outcome satisfaction did not explain a significant amount of variance in exercise adherence (onsite, offsite, and total) beyond that explained by self-efficacy (task and self-regulatory) alone.

Taken together, this research has enhanced our knowledge of the psychosocial predictors of adherence to the maintenance cardiac rehabilitation exercise prescription among men with CAD. These findings also have important implications for health care professionals working in the area of cardiac rehabilitation. Specifically, it is up to health care professionals to ensure that patient beliefs regarding the maintenance cardiac rehabilitation exercise prescription are accurate, and that patients are efficacious in their ability to engage in the elemental physical aspects of exercise and to effectively schedule exercise into their daily lives.

Acknowledgements

Scott, I dedicate this thesis to you. You are my best friend and my greatest love…I would not be *me* without *you*. Every step of the way to where I am today, you have been right beside me…thank-you for sharing in this very special accomplishment with me. You have always had a special gift of listening, turning negatives into positives, making me laugh until my stomach hurts and most of all bringing out the best in me. I am truly blessed to have you in my life. Now that I have completed my academic journey…I can't wait to begin the next phase of our lives together. I love you always.

Mom, Dad, Heather and Carolyn – I also dedicate this thesis to you. Mom and Dad, without your unconditional love, patience, encouragement, and support….I would not have made it past that first challenging year of university without you…every great accomplishment including this one I share with both of you…thank-you for sharing in my many years of academia with nothing but enthusiasm, you are the best parents in the whole world and I love you both very much. Heather, as my big sister I have looked up to you for many things and you have always been there with words of encouragement and support. I will never forget the flowers and beautiful card that you gave to me after finding out the news that I had been accepted to grad school. Thank-you for sharing in this accomplishment with me, I love you very much. Carolyn, as my little sister, to watch you follow in my foot steps as you contemplate graduate school makes me so proud…your compliments and the way that you look up to me and think of me with such high esteem has always made me feel confident in my abilities…I could always count on you for an encouraging word or compliment…Thank-you for sharing in this accomplishment with me…I love you very much.

Dr. Kathleen Martin Ginis - Thank-you so much for giving me the incredible opportunity to be one of your graduate students. So many accomplishments in my life that I am so proud of are because of you. My CACR research award, co-authored book chapter and JCR publication, as well as the many opportunities that you have provided me to present my research at Health and Exercise Psychology conferences, and of course this thesis. I admire you as a wonderful person as well as an incredible and very distinguished researcher and educator. Thank-you for all of your support, kindheartedness, enthusiasm and encouragement every step of the way to completing my Masters Degree.

Dr. Neil McCartney – Thank-you for always making me laugh! I could always count on you for words of encouragement and support when I needed them. Thanks for making my Masters experience a memorable one.

My thesis committee – Dr. Kim Gammage, Dr. Jean Wessel, and Dr. Neil McCartney. Thank-you so much for your keen interest, your very helpful feedback and your support.

Cheri – Although our days at McMaster together have been short-lived, our laughs, hugs, smiles, happiness, and words of encouragement have been enough to last a lifetime. You are a wonderful person, and an even more wonderful friend. From the day that I first started to work with you, you have inspired me in so many ways… thank-you for your being such a pivotal part of me being where I am today. Thank-you for always listening to my sorrows and dreams… I will always hold you close to my heart!

Melanie – Thank-you for being such a great friend to me over the past two years. Your kind and generous spirit coupled with your amazing intellect will take you wherever you want to go! I am so glad that we were able to share the Masters experience together and I am so grateful for the wonderful friendship that we share.

My Labmates – Amy, Mary and Tara. Thank-you for your keen interest in my research and personal endeavors. Whenever I had a question (or technical computer/printer catastrophe ☺), you were always there to listen and offer your suggestions. I wish all of you the very best in your future pursuits!

Karen, Martha, Adrienne, Maddy and Charlyn – Thank-you for your help with recruitment! Your interest and support of my research meant a lot to me!

MacSeniors - A very special thank-you to the MacSeniors who have always has a special talent of listening…and providing words of encouragement and support when I needed them most.

MacTurtles – You are a truly amazing group of people! Without you ….I would not have been able to complete my Masters degree…thank-you!!

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Introduction

Epidemiological evidence continues to reveal cardiovascular disease (CVD) as the leading cause of mortality among Canadian men and women (Heart and Stroke Foundation, 2000). Statistics Canada estimates that as the proportion of older adults in the population increases, the number of individuals with CVD is expected to grow such that by the year 2026, an estimated 90,000 to 106,000 Canadians will be hospitalized for traumatic cardiovascular events each year (e.g., myocardial infarction; Johansen, Nair, Taylor, 1998). In addition, it has been estimated that among individuals who have reached the age of 40, the likelihood of dying from CVD is one in two for men and one in three for women (Stone, Cyr, Friesen, Kennedy-Symonds, Stene, Smilovitch, 2001). Although there are many different forms of CVD (e.g., chronic heart failure, stroke, congenital heat disease), coronary artery disease (CAD) is its primary manifestation accounting for 56% of all cardiovascular related deaths in Canada (Heart and Stroke Foundation, 2000).

"Heart hazards" or risk factors including both physiological factors (e.g., high dietary cholesterol and saturated fat intake) and psychosocial factors (e.g., depression), have been found to be salient predictors of morbidity and mortality among individuals with CAD (Cornoni-Huntley, LaCroix, Havlik, 1989; Heart & Stoke Foundation, 1998; Mosca, Manson, Sutherland, 1997; Stokes, Kannel & Wolf, 1987). However, regular exercise via onsite (i.e., facility-based) supervised cardiac rehabilitation programs as well as offsite exercise (i.e., exercise outside of the facility-based program), is an effective strategy for reducing the detrimental effects of these heart hazards. Specifically, the accumulation of 30 minutes of exercise most days of the week is associated with attenuated disease progression and reduced incidence of fatal recurrent traumatic cardiovascular events (O'Connor, Buring, Yusef, 1989; Oldridge, Guyatt, Fischer, Rimm, 1988). Yet, it is important to note that varying levels of exercise adherence may have varying effects upon the physiological and the psychosocial well-being of individuals with CAD.

In cardiac rehabilitation, adherence is typically operationalized as either the percentage of supervised, onsite cardiac rehabilitation sessions attended (e.g., exercise *program* adherence; Oldridge, 1988) and / or the extent to which individuals with CAD report engaging in an offsite exercise prescription (e.g., exercise *prescription* adherence; Martin & Sinden, 2001). While the majority of research to date among the CAD population has focused on the predictors of adherence to the acute phase of cardiac rehabilitation (i.e., 0-6 months post-cardiovascular event), there is a striking lack of research in relation to the predictors of adherence to the maintenance phase of cardiac rehabilitation (i.e., > 6 months post-cardiovascular event). Given the dramatic impact that prolonged exercise participation has been demonstrated to have on health and longevity (Blair et al., 1989; Paffenbarger & Hyde, 1988), it is important to determine what factors are most predictive of sustained exercise adherence among individuals with CAD. In addition, given the lack of formal, facility-based maintenance cardiac rehabilitation programs, it is particularly important to determine what factors predict adherence to offsite exercise (i.e., independent exercise outside of the facility-based program), as this is often the only exercise option for individuals who have completed the acute phase of cardiac rehabilitation. The proceeding three sections will focus on the physiological and the psychosocial benefits of adherence to exercise-based cardiac rehabilitation, as well as the theoretical foundations underlying sustained exercise adherence. These sections will be followed by a detailed review of the literature with respect to the predictors of sustained exercise adherence among various asymptomatic populations as well as among individuals with CAD.

Exercise and Physiological Well-Being Among Individuals with CAD

The physiological benefits of exercise-based cardiac rehabilitation programs have been well-documented (Beniamini et al., 1999; Dengel et al., 1998; McCartney, 1998; McKelvie & McCartney, 1990). Specifically, the two primary components of exercise-based cardiac rehabilitation programs--dynamic aerobic exercise (e.g., walking, cycling) and resistance exercise (e.g., circuit strength training)--have been shown to significantly improve the overall cardiovascular health of individuals with CAD. According to the existing literature, the most substantial physiological benefits of exercise-based cardiac rehabilitation include improved exercise tolerance, improved cardiac symptomatology, improved blood lipid levels and reduced all-cause and CAD-specific mortality (Wenger et al., 1995). These four exercise-induced physiological benefits will be addressed in the proceeding paragraphs.

First, exercise training has been found to improve objective measures of exercise tolerance among individuals with CAD through a variety of physiological mechanisms including hemodynamic and cardiovascular changes, alterations in neurohumoral responses, and peripheral changes in skeletal muscle and oxygen delivery (Balady & Weiner, 1992). Increases in peak oxygen uptake among individuals with CAD have been found to range from 11% to 66% following 3 to 6 months of exercise training, with the greatest improvements among the most unfit (Clausen, 1976; Thompson, 1998). With regard to submaximal exercise tolerance, exercise training among individuals with CAD has been shown improve their ability to exercise longer at a given work rate with a lowered heart rate and blood pressure response compared with pretraining levels (Balady & Weiner, 1992; Froelicher, Jensen, Sullivan; 1985; Gleser & Vogel; 1971; Haskell & DeBusk, 1979; Sivarajan, Bruce, Lindskog, Almes, Belanger, Green, 1982). This effect is particularly beneficial among individuals with CAD because manifestations of ischemia tend to occur at higher work levels, and enhanced submaximal endurance capacity allows individuals greater ability to perform submaximal tasks (Costill, Branam, Moore, Sparks, Turner, 1974; Myers, Ahnve, Froelicher, 1984; Todd & Ballantyne, 1990).

Second, cardiac rehabilitation exercise training has been shown to decrease symptoms of angina pectoris among individuals with CAD (Hedback, Perk, Engvall, & Areskog, 1990). Consistent with individual reports of reduced symptomatology following exercise rehabilitation, improved clinical measures of myocardial ischemia have been identified among these individuals via electrocardiographic (ECG) and nuclear cardiac techniques (Wenger et al., 1995). Although no mechanisms have yet been conclusively determined to account for changes in the ischemic threshold, these data suggest an increase in myocardial oxygen delivery and / or decreased oxygen utilization following training (Balady, Fletcher, Froelicher, 1994).

Third, exercise training, in conjunction with a low-fat, low-cholesterol diet and a weight reduction program, has been shown to have a beneficial effect on lipid profiles (Wood, Stefanick, Williams, Haskell, 1991) and may retard the progression of atherosclerotic CAD (Ornish, Brown, Scherwitz, 1990; Schuler, Hambrecht, Schelierf, 1992). Regular exercise participation among individuals with CAD yields, on average, a 5% to 16% rise in high-density lipoprotein (HDL) cholesterol concentration, although evidence that exercise affects low-density lipoprotein (LDL) and total cholesterol levels is often conflicting (Bittner & Oberman, 1993). That having been said, two well-controlled trials of exercise plus low-fat diet in the CAD population revealed significant reductions in total cholesterol, LDL, and triglyceride levels with concomitant increases in HDL levels (Ornish et al., 1990; Schuler et al., 1992). Exercise training among individuals with CAD has also been shown to be useful as an adjunct treatment in the management of related comorbidities, including obesity (Lampman & Schteingart, 1989), diabetes (Bittner & Oberman, 1993; Leon, 1992) and hypertension (Bittner & Oberman, 1993; Pescatello, Fargo, Leach, Scherzer, 1991).

Finally, according to the existing scientific literature, there is no evidence for a reduction in cardiac-specific *morbidity*, most specifically nonfatal reinfarction, as a result of exercise rehabilitation (Wenger et al., 1995). In contrast, on the basis of meta-analytical data, individuals assigned to supervised and prescribed exercise programs (O'Connor et al., 1989; Oldridge et al., 1988) have been found to have 20% to 25% lower CAD-specific *mortality* rates, as well as significantly lower all-cause mortality as compared to their sedentary counterparts. In other words, exercise rehabilitation has been found to reduce cardiac-specific mortality, but *not* morbidity. Given that the data for these meta-analyses were collected before the clinical use of thrombolytic agents and the widespread use of adrenergic blocking agents in the treatment of myocardial infarction (e.g., both of these agents have yielded important survival benefits after myocardial infarction), the effect of exercise training on contemporary cardiovascular mortality rates may be of a lower magnitude than shown earlier (Balady et al., 1994). With this consideration in mind, several population-based studies (Kannel, Belanger, D'Agostino, Isreal, 1986; Leon, Connett, Jacobs, Rauramaa, 1987; Paffenbarger & Hale, 1975; Paffenbarger, Hyde, Wing, Hsieh, 1986) have found that incremental levels of regular physical activity were inversely proportional to long-term cardiovascular mortality such that the risk of death became progressively lower as physical activity levels increased from 500 to 3500 kcal/wk of energy expended (Paffenbarger et al., 1986). Moreover, higher levels of physical fitness, when measured with an exercise tolerance test, are associated with significantly reduced subsequent cardiovascular mortality (Blair, Kohl, Paffenbarger, Clark, Cooper, Gibbons, 1989; Myers, Prakash, Froelicher, Do, Partington, Atwood, 2002; Sandvick, Erikssen, Thoulow, Erikssen, Mundal, Rodahl, 1993). Again, since risk factor modification was often performed together with exercise training in these trials, the independent beneficial effects of exercise on mortality are unclear. The potential additional benefits of close patient surveillance, support, and counseling to maintain health behavior changes and additional therapist / clinician attention directed toward patients in cardiac rehabilitation must be accounted for as well. In sum, exercise training has been shown to improve exercise tolerance, cardiac symptomatology and lipid profiles, and reduce mortality among individuals with CAD.

In consideration of the aforementioned physiological benefits of exercise-based cardiac rehabilitation, it is important to recognize that sustained exercise adherence is required to maintain these benefits. Although onsite, supervised cardiac rehabilitation exercise training initially promotes increased participation in exercise outside of the rehabilitation setting (e.g., offsite exercise), this effect does not tend to persist following the termination of formal onsite exercise-based cardiac rehabilitation (Wenger et al., 1995). In fact, among patients who discontinue supervised onsite cardiac rehabilitation, less than 25% continue to exercise offsite at levels that will maintain or improve cardiorespiratory fitness (Daltroy, 1985; Radtke, 1989). Thus, given the minimal availability of onsite maintenance cardiac rehabilitation programs, it is important to determine what factors predict sustained offsite exercise adherence as this is often the only exercise option available to patients following completion of the acute phase of cardiac rehabilitation. Sustained exercise adherence is important not just for the numerous physiological benefits to be gained, but also for the significant psychosocial benefits individuals with CAD may expect to derive.

Exercise and Psychosocial Well-Being Among Individuals with CAD

Over the past two decades, an increasing number of studies have demonstrated the beneficial effects of exercise-based cardiac rehabilitation on the psychosocial well-being of individuals with CAD (Blumenthal, O'Connor, Hinderliter, 1997; Carlson, Norman, Feltz, Franklin, Johnson, Locke, 2001; Friedman, Thoresen, Gill, 1986; Rozanski, Blumenthal, Kaplan, 1999; Schneidermann, Antoni, Saab, Ironson, 2001). The results of these studies are consistent with the widespread belief among cardiac rehabilitation professionals that cardiac rehabilitation exercise training improves the overall sense of well-being among participants (Wenger et al., 1995).

Depression, anxiety and hostility are aspects of psychosocial well-being that are commonly studied together in research pertaining to the relationship between psychosocial well-being and exercise among individuals with CAD. For instance, Milani and colleagues (1996) examined the effects of exercise-based cardiac rehabilitation programs on the psychosocial well-being of a total of 338 individuals who had experienced a major cardiac event 4 to 6 weeks previously and who were participating in the acute phase of cardiac rehabilitation consisting of 36 sessions over a 3-month period. Depressive symptoms and other psychosocial characteristics (e.g., anxiety, somatization, hostility), as well as quality of life parameters, were assessed by validated questionnaires at entry and upon completion (12 weeks / 36 sessions) of the cardiac rehabilitation program. At baseline, individuals classified as depressed had lower scores for mental health, energy / fatigue, general health, pain, overall function, well-being, and total quality of life; and had greater scores for somatization, anxiety, and hostility than those of nondepressed individuals. After cardiac rehabilitation, depressed individuals had marked improvements in depression, anxiety, somatization, and hostility. In addition, depressed patients exhibited statistically greater improvements in quality of life parameters than did nondepressed patients.

Another aspect of psychosocial well-being, life stress, has been found to be positively affected by exercise participation among individuals with CAD. Specifically, Roviaro and colleagues (1984) found that individuals with CAD who were involved in a 3-month exercise-based cardiac rehabilitation program had greater improvements in both the physiological (e.g., reduced resting heart rate and blood pressure) and psychosocial (e.g., enhanced coping abilities) manifestations of life stress as compared to their routine care counterparts.

Self-efficacy is another aspect of psychosocial well-being that has been found to be a particularly important exercise outcome among individuals with CAD. Self-efficacy reflects beliefs in one's skills and abilities to organize and execute necessary courses of action that are required to perform a given behaviour (Bandura, 1986; 1997). A number of studies have examined the impact of exercise training on the self-efficacy of individuals with CAD. For instance, Ewart and colleagues (1986) examined the relationship between self-efficacy and strength gains during 10 weeks of circuit weight training in a sample of 40 men with CAD. The results of this study revealed a 24% increase in the participants' one repetition maximum (1RM) and a 12% improvement in their treadmill endurance time. Participants also exhibited enhanced self-efficacy for tasks requiring significant arm and / or leg strength. Another study (Beniamini, Rubenstein, Zaichowski, Crim, 1997) examined the effects of 12 weeks of strength training on the psychosocial well-being of 38 individuals with CAD (29 men and 9 women) who were part of an outpatient cardiac rehabilitation aerobic exercise program. Findings revealed that the strength-trained individuals increased their self-efficacy scores for lifting, push-ups, climbing and jogging when compared to a control group. The strength-trained group also had greater improvements in emotional well-being as measured by the Profile of Mood States (POMS) and the Medical Outcome Survey Short Form 36 (MOS SF-36) than the control group. In sum, the findings of these two studies have revealed a beneficial impact of strength training on self-efficacy and emotional well-being.

Collectively, these studies suggest that exercise can have significant positive effects on the psychosocial well-being of individuals with CAD. These positive effects may in turn reduce the risk of experiencing a recurrent fatal cardiovascular event (Graves & Miller, 2003). However, consistent with the physiological benefits of exercise, the psychosocial benefits of exercise can only be achieved through sustained exercise adherence (Carrel & Mohasci, 1998). The following sections will address what is known about adherence to exercise-based cardiac rehabilitation in the acute phase (i.e., 0-6 months) as well as in the maintenance phase (i.e., greater than 6 months).

Adherence to Exercise in the Acute Phase of Cardiac Rehabilitation

Exercise-based cardiac rehabilitation aims to enhance and maintain cardiovascular health through individualized exercise programs designed to optimize both physiological and psychosocial well-being (Stone et al., 2001). In Canada, the recommended duration of the acute phase of exercise-based cardiac rehabilitation is 6 months (CACR, 1999) and typically emphasizes supervised onsite exercise, with little emphasis on unsupervised offsite exercise (Carlson et al., 2001). The achievement of optimal cardioprotective benefits during the acute phase depends on the extent to which the cardiac patient adheres to the prescribed exercise regimen (Bock, Bess, Marcus, Bernardine, Pinto, Forsyth, 2001; Gielen, Schuler, Hambrecht, 2001).

Adherence, with respect to the acute phase of cardiac rehabilitation generally refers to the number of supervised onsite exercise sessions attended by the patient. Patients who discontinue their participation in the program or fail to attend a specified minimum number of consecutive exercise sessions are considered to be dropouts (Oldridge, 1988). A review of the cardiac rehabilitation literature reveals that adherence to acute cardiac rehabilitation programs is poor (Carlson, 2001; Paffenbarger & Hyde, 1988). Specifically, by 6 months, approximately 50% of patients who initiate formal cardiac rehabilitation will drop out of the program (CACR, 1999; Carlson et al., 2001). By 1 year, up to 80% of patients no longer participate in formal, supervised onsite cardiac rehabilitation (Balady et al., 1994; Hedback, Perk, Wodlin, 1993). Among patients who discontinue supervised onsite cardiac rehabilitation (either during or after the acute phase of cardiac rehabilitation) less than 25% continue to exercise offsite at levels that will maintain or improve cardiorespiratory fitness (Daltroy, 1985; Radtke, 1989).

Adherence to Exercise in the Maintenance Phase of Cardiac Rehabilitation

The maintenance phase of exercise-based cardiac rehabilitation is a lifelong endeavor, which generally begins 6 months post-cardiovascular event (i.e., following the acute phase of cardiac rehabilitation). It is typically characterized by supervised onsite exercise sessions as well as an independent offsite exercise prescription (American Association of Cardiovascular and Pulmonary Rehabilitation, 1999). In accordance with the recommendations of the Centres for Disease Control and Prevention (CDC), the

American College of Sports Medicine (ACSM) and Health Canada, maintenance cardiac rehabilitation aims to promote optimal cardioprotective benefits by encouraging patients to exercise at a mild to moderate intensity for at least 30 minutes on most days of the week (Pate et al., 1995). Patients are generally encouraged to fulfill these recommendations through two to three weekly supervised onsite exercise sessions in addition to offsite exercise sessions on most of the remaining days of the week (American Association of Cardiovascular and Pulmonary Rehabilitation, 1999).

Williams and Lord (1995) suggest that the recommendations for increasing participation in exercise programs should not be limited to supervised onsite exercise but should also include a broader interpretation of exercise programming (e.g., offsite, unsupervised exercise). Indeed, with regard to cardiac rehabilitation programs in particular, Higgins and colleagues (2001) have found that the combination of both onsite (e.g., facility-based) and offsite exercise sessions appears to be optimal with respect to the maintenance of cardiovascular health. Specifically, onsite exercise sessions allow for regular patient monitoring, feedback, education and support which has been shown to enhance self-efficacy and help patients to change health risk behaviours (e.g., physical inactivity, poor diet) and to maintain positive health behaviours (e.g., regular exercise, heart healthy diet; Baranowski, Perry, Parcel, 1996; Franklin, Hall, Timmis, 1997; Lewis, 1996). In contrast, offsite exercise sessions tend to be convenient for the patient (e.g., minimal barriers to participation such as travel), and can give patients responsibility for their disease management while promoting independence and thus avoiding complete dependence on formal facility-based cardiac rehabilitation (Carlson et al., 2001).

While exercise appears to be the most easily adopted health-related behaviour among individuals with CAD, the long-term maintenance of this behaviour is more problematic (Haynes, 1984; Houston Miller & Barr Taylor, 1995; Ice, 1985; Kinnard, Yoham, Kieval, 1982; Oldridge et al., 1983; Oldridge & Stoedefalke, 1984). One reason for maintenance problems is that following completion of the acute phase of cardiac rehabilitation, most programs do not offer patients the option of continuing their participation in the program as "maintenance" patients. This is problematic as less than 25% of patients who discontinue supervised cardiac rehabilitation continue to exercise offsite at levels that will maintain or improve cardiorespiratory fitness (Daltroy, 1985; Radtke, 1989). There is a paucity of maintenance cardiac rehabilitation programs because they tend to generate less revenue and require more facility time and space than acute programs, due to the gradual accumulation of participants (Brubaker et al., 2000). Moreover, there appears to be an unfortunate assumption that upon completion of the acute phase of cardiac rehabilitation, patients will be able to effectively self-maintain appropriate health behaviours including exercising on a regular basis (Brubaker et al., 2000) and thus maintenance programs are not necessary. To the contrary, it has been observed that upon exiting a facility-based program, patients have difficulty retaining the positive benefits that were derived from the acute phase of cardiac rehabilitation (Brubaker et al., 1996).

Among the very few maintenance cardiac rehabilitation programs available to patients, the goal is to facilitate sustained adherence to both onsite and offsite exercise sessions through the provision of performance feedback, social support, and heart health education during onsite exercise sessions (i.e., the social support, feedback, and education provided by health care professionals may serve to enhance patient motivation to fulfill their offsite exercise prescription). Not surprisingly, research regarding exercise maintenance among the CAD population is scarce and thus the true prevalence of successful exercise maintenance is unknown (Marcus et al., 2000). Because the long-term success of any secondary prevention program such as exercise-based cardiac rehabilitation is directly related to patient adherence (Balady et al., 1994), it is important to determine what factors are most predictive of sustained exercise adherence among individuals with CAD. In addition, given the lack of maintenance cardiac rehabilitation programs, it is also important to determine what factors predict adherence to independent offsite exercise as this is often the only exercise option available to patients following completion of the acute phase of cardiac rehabilitation. In sum, identifying the predictors of sustained exercise adherence is a first and crucial step towards trying to enhance exercise adherence among individuals with CAD.

Theoretical Foundations Underlying Sustained Exercise Adherence

One of the most frequently identified psychosocial determinants of adherence to exercise is self-efficacy, which reflects beliefs in one's skills and abilities to organize and execute necessary courses of action that are required to perform a given behaviour (Bandura, 1986; 1997). Self-efficacy has been theorized to influence the activities that individuals choose to approach, the effort expended on such activities, and the degree of persistence demonstrated in the face of failure or environmental demands and challenges (Bandura, 1986). A review of the literature on self-efficacy and exercise adherence reveals self-efficacy to be most important in situations where exercise presents the greatest challenge such as the initial stages of adoption (McAuley, 1992) and the long-term maintenance of exercise (McAuley, Lox, Duncan, 1993). In addition, self-efficacy has been found to be particularly important in relation to adherence to exercise that is prescribed for the secondary prevention of disease (e.g., secondary prevention of CAD; Ewart, Taylor, Reese, DeBusk, 1983). Individuals with a robust sense of self-efficacy are likely to expend greater amounts of effort in attaining health-promoting levels of exercise, and when faced with setbacks, are more likely to persist in their exercise pursuits and redouble their efforts as compared to individuals with a weak sense of self-efficacy (McAuley & Mihalko, 1998).

Bandura (1990) has also suggested that self-efficacy judgments are not just about the skills one has, but also about what one can do with those skills. In other words, one must have some basic "skill" self-efficacy as well as self-efficacy for using those skills in order to produce enduring behavioural patterns. Research on exercise adherence has supported the idea that there are different types of self-efficacy and that these types are differentially related to varying levels of exercise involvement (Rodgers & Sullivan, 2001). Specifically, task self-efficacy refers to an individual's confidence in his or her ability to perform the elemental physical aspects of exercise (e.g., confidence in one's ability to walk for 30 minutes at a prescribed intensity level) and tends to be the most important predictor of adherence during the initiation phase of behavioural change (Rodgers, Hall, Blanchard, McAuley, Munroe, 2002). In contrast, self-regulatory efficacy refers to an individual's confidence in his or her ability to perform these tasks under challenging conditions (e.g., confidence in one's ability to overcome exercise barriers and to schedule regular exercise bouts in spite of environmental challenges or time demands; DuCharme & Brawley, 1995; Rodgers et al., 2002) and has been found to be a salient predictor of adherence to exercise beyond the initiation phase (e.g., the maintenance phase). Thus, in accordance with Bandura (1995), it is self-regulatory efficacy that distinguishes between behavioural phases (e.g., initiation versus maintenance, Rodgers & Sullivan, 2001).

In support of this distinction between task and self-regulatory efficacy, Rodgers and colleagues (2002) have indicated that the presence of task self-efficacy alone will be insufficient to maintain regular exercise behaviour. Specifically, even when exercisers are completely confident that they can perform the requisite basic skills (e.g., walking, lifting weights), they might find it difficult to exercise when their workload increases or a need for childcare arises. Therefore, in order to maintain regular exercise, individuals would have to have some confidence in their self-regulatory skills (e.g., ability to overcome barriers and scheduling conflicts). Indeed, Rodgers and her colleagues (2002) have suggested that it is possible that task self-efficacy might be a "necessary but not sufficient" condition for sustained exercise adherence, and that self-regulatory efficacy is required for the maintenance of regular exercise. With these considerations in mind, it seems sensible to examine more than one aspect of self-efficacy in relation to sustained exercise behaviour (e.g., both task and self-regulatory efficacy) rather than to assume that a single dimension of efficacy may account for behavioural variability (DuCharme & Brawley, 1995). Although the likelihood is high that task and self-regulatory efficacy may be strongly correlated, it is unlikely that there will be perfect correspondence between them. Indeed, the two types of self-efficacy (or more) together may account for more variation in behaviour (e.g., exercise adherence) than either measure alone (McAuley & Mihalko, 1998).

As previously mentioned, while self-efficacy (e.g., task and self-regulatory efficacy) has been found to be a significant predictor of both exercise initiation and long-term exercise maintenance, its relative predictive utility has been found to differ during these behavioural phases. Specifically, DuCharme and Brawley (1995) have suggested that the influence of self-efficacy on adherence will probably be most important in the early phases of exercise (e.g., the adoption and initiation phases) when an individual must consciously decide on what to do to attend exercise sessions regularly. Later, in the maintenance phase of exercise, it has been argued that adherence behaviour becomes more habitual in nature (cf. Maddux, 1993), with less apparent influence from conscious processes to encourage motivated behaviour. In other words, because self-efficacy beliefs are greatly influenced by actual behavioural performance, as behaviours become habitual, self-efficacy expectancies are likely to remain highly correlated with behaviour but are less likely to *influence* behaviour because habitual behaviours tend to be automatic and not the result of conscious decisions (Maddux, 1993). In such circumstances, it is argued that the pattern of past behaviour would be a more reliable predictor of current behaviour than various affective or cognitive beliefs such as self-efficacy (DuCharme & Brawley, 1995).

In addition to past exercise behaviour, and given the fact that exercise maintenance tends to be a particularly challenging habit to develop (e.g., as compared to tooth brushing or seatbelt-buckling), Rothman (2000) has suggested that decisions regarding behavioural maintenance involve a consideration of whether the outcomes associated with the new pattern of behaviour are sufficiently desirable to warrant continued action. Thus, in addition to self-efficacy, habit development, and past exercise behaviour, the decision to maintain a behaviour is thought to depend on people's perceived satisfaction with achieved outcomes (Rothman, 2000). The outcome satisfaction approach to behavioural maintenance (Rothman, 2000) is based upon the guiding premise that people will maintain a change in behaviour *only* if they are satisfied with what they have already accomplished. The feeling of satisfaction indicates that the initial decision to change the behaviour was correct, and furthermore, it sustains the effort people must put forth to monitor their behaviour and minimize vulnerability to relapse.

It has also been suggested that people choose to maintain a behaviour in order to preserve a favourable situation and to avoid an alternate, less favourable state (Rothman, 2000). For example, individuals with CAD may choose to maintain their exercise behaviour in an effort to preserve their current health status and to reduce their likelihood of suffering a recurrent fatal cardiovascular event. Thus, the decision processes that guide behavioural maintenance can be conceptualized as an avoidance-based self-regulatory system wherein progress is indicated by a sustained discrepancy between a current state (e.g., healthy) and an undesired reference state (e.g., unhealthy; Carver & Scheier, 1990). Indeed, people's motivation to maintain their current level of participation may stem from their expectation of future dissatisfaction if they were to decrease or discontinue their exercise participation.

The outcome satisfaction approach to explaining behavioural maintenance further suggests that people determine whether they are satisfied with the outcomes afforded by a new pattern of behaviour by monitoring how a change in their behaviour has influenced how they feel. For instance, if individuals who exercise are able to gain and monitor information regarding their improved fitness level, % body fat, and other valued outcomes, they may become pleased with how they feel about their body's capabilities (Brubaker et al., 2000). This feedback may in turn lead to stronger feelings of self-efficacy and outcome satisfaction, and thus may contribute to sustained exercise adherence.

People's expectations have also been found to serve frequently as a standard against which they evaluate the outcomes they have obtained (e.g., Gollwitzer, 1996; Rusbult & Van Lange, 1996; Schwarz & Strack, 1991). Given the focal role that expectations serve in the process of behavioural initiation, people are likely to hold clear expectations about what a new pattern of behaviour will provide. Thus, to the extent that people's experiences meet or exceed their expectations, they will be satisfied with the behaviour and motivated to maintain it (Rothman, 2000). In contrast, when people's experiences fail to meet their expectations, they will be dissatisfied with the change in their behaviour and less motivated to sustain it.

Bandura (1997) has suggested that some of the most valued rewards of activities are in the self-satisfactions derived from fulfilling personal standards. In fact, the subjective perceptions of self-satisfaction associated with personal accomplishments may be valued more highly than objective tangible payoffs (e.g., increased functional capacity), and when the two sources of incentives conflict, the subjective incentives often override the influence of objective incentives (Bandura, 1997). For example, in a sample of cardiac patients, self-reported functional status was considered just as important, if not more so, than actual functional capacity (e.g., $V0_2$) in determining patients' ability to be active in their daily lives following a major cardiovascular event (Lichtenberger, Martin, MacKenzie, McCartney, 2003).

Predictors of Sustained Exercise Adherence

Adherence to exercise is a multifaceted phenomenon, with disparate factors proposed to predict continued participation at different phases of the exercise process (e.g., Fontana, Kerns, Rosenberg, Marcus, Colonese, 1986). Because behavioural maintenance has been operationalized as action sustained over time, it has often been *incorrectly* predicted to rely on the same set of behavioural skills and motivational factors that facilitate the initial change in behaviour (Rothman, 2000). However, impressive rates of initial changes in behaviour have not consistently translated into similar rates of behavioural maintenance (Rothman, 2000). Likewise, factors that are good predictors of behavioural initiation tend not to be very good predictors of behavioural maintenance (Lord, Ward, Williams, Strudwick, 1995; Rejeski, Brawley, Ettinger, Morgan, Thompson, 1997). Given that the bulk of research to date has focused on the predictors of adherence during the acute phase of cardiac rehabilitation, the following review will examine the most prominent psychosocial predictors that have been found to be significantly associated with sustained exercise adherence including (1) self-efficacy (e.g., task and self-regulatory efficacy), (2) outcome satisfaction, and (3) a combination of self-efficacy and outcome satisfaction.

Due to the limited scope of the empirical literature with respect to sustained exercise adherence among the clinical cardiac population, it is necessary to extrapolate from long-term exercise adherence studies involving healthy populations. Similar to the healthy population, within the first 6 months of formal exercise participation, only 50% of cardiac patients are considered to be exercise maintainers (CACR, 1999; Carlson et al., 2001). Thus, it is believed that studies of asymptomatic populations will provide a reasonable indication of the predictors of sustained exercise adherence among the cardiac population. All of the studies that are reviewed in the proceeding section have examined individuals who are considered to be in the maintenance phase of exercise adherence, which is defined by the CDC/ACSM as having engaged in regular exercise for at least 6 months (Dunn et al., 1999; Pate et al., 1995).

Self-Efficacy

As previously discussed, whereas task self-efficacy refers to an individual's confidence in his or her ability to perform the elemental physical aspects of a task, self-regulatory efficacy refers to an individual's confidence in his or her ability to perform these tasks under challenging conditions (e.g., confidence in one's ability to overcome exercise barriers and to schedule regular exercise bouts in spite of environmental challenges or time demands; DuCharme & Brawley, 1995; Rodgers et al., 2002). With regard to adherence to supervised, onsite exercise, self-regulatory efficacy (including both barriers and scheduling self-efficacy) has been found to be a particularly important predictor as is demonstrated in the proceeding studies.

Rodgers and her colleagues (2002) examined task and scheduling self-efficacy as predictors of onsite exercise adherence among 144 men and 97 women participating in supervised facility-based exercise programs. At baseline, participants were administered measures of task and scheduling self-efficacy. Four weeks later, participants were administered a questionnaire to assess their onsite exercise adherence during the preceding four weeks. The findings of this study indicated that only scheduling self-efficacy was a significant predictor of onsite exercise adherence during the four weeks. Thus, it was the participants' confidence in their ability to schedule regular exercise, rather than their confidence in their ability to perform the elemental physical aspects of exercise, that was important with respect to their adherence to the onsite exercise program over a prolonged period of time.

Another study (Garcia & King, 1991) compared the predictive utility of self-efficacy theory versus a trait measure of self-motivation among 74 men and women ranging in age from 50-64 years of age. Participants were randomly assigned to either a supervised, facility-based exercise program or to an assessment-only control condition for a period of 1 year. Barriers self-efficacy and trait self-motivation were assessed at baseline, 6 months and 1 year. Participants in the exercise condition were also asked to record each bout of exercise in monthly logs. Barriers self-efficacy was significantly associated with exercise adherence at both 6 months and 1 year (*r*s = .42 and .44 respectively), whereas self-motivation was not. Multiple regression analyses also revealed barriers self-efficacy to be a significant predictor of adherence beyond the 6-month phase (during months 7-12) explaining a significant 17% of the variance in adherence. These findings suggest that self-regulatory efficacy (e.g., barriers self-efficacy) is more important in relation to sustained exercise adherence than the trait of self-motivation. In sum, the preceding studies provide empirical support for the relative importance of self-regulatory efficacy in the prediction of sustained adherence to supervised onsite exercise. The next few paragraphs examine self-efficacy in the prediction of adherence to unsupervised, offsite exercise adherence.

The termination of a supervised onsite exercise program has been found to significantly affect sustained exercise adherence. According to McAuley (1993), the cessation of an onsite exercise program places the onus for sustained exercise adherence entirely on participants, which is considered to be a high-demand situation. As previously discussed, as the desired behaviour (e.g., sustained adherence) becomes more demanding of the individual, requiring greater cognitive decision making, self-efficacy is hypothesized to play a more important role in the execution of that behaviour (Bandura, 1986, 1989). As demonstrated in the proceeding studies, task self-efficacy has been found to be a particularly important predictor of adherence to offsite exercise following the termination of formal onsite exercise programs.

Moore and colleagues (2002) conducted a 6-month prospective study to determine the predictors of adherence to offsite exercise following the acute phase of cardiac rehabilitation (e.g., beyond the first 6 months). The exercise adherence of 94 individuals with CAD (30 women, 64 men) including details regarding the frequency, duration, and intensity of exercise participation was followed over a period of 6 months. The predictor variables included participant demographics, social support, depression, task self-efficacy, exercise benefits / barriers, motivation, and problem solving. Measures of the predictor variables were collected by means of a 45-minute interview, which was conducted exactly 6 months following the termination of the acute phase of cardiac rehabilitation. Hierarchical multiple regression analyses revealed that only task self-efficacy was a significant predictor of the frequency, duration and intensity of independent offsite exercise performed by participants. No other significant relationships were found between adherence to offsite exercise and the aforementioned predictor variables. Thus, the findings of this study indicate that task self-efficacy is particularly important in relation to offsite exercise adherence following the acute phase of cardiac rehabilitation.

In another study, McAuley and colleagues (1993) evaluated offsite exercise adherence, task self-efficacy, and physiological change in older adults at 9-month follow-up to a 5-month supervised onsite exercise program. Men and women (mean age = 54 years) completed graded exercise testing, body composition, and physical performance testing following the 5-month onsite exercise intervention and 9 months later during a follow-up assessment of offsite exercise adherence. Task self-efficacy assessments were also conducted prior to and following each graded exercise test and during the last week of the program. Results revealed that task self-efficacy was the only variable to significantly predict adherence to offsite exercise during follow-up. In addition, descriptive analyses revealed that previous attendance in the program, aerobic capacity, and task self-efficacy all significantly discriminated between adherers and nonadherers to offsite exercise during the 9-month follow-up.

McAuley (1993) also investigated the role played by self-efficacy in adherence to offsite exercise among 82 middle-aged adults 4 months after the termination of a 5-month onsite exercise program. In addition to completing the 7-day Physical Activity Recall and a combined measure of task and self-regulatory efficacy (e.g., the items on both scales were highly correlated [r =.88] and were therefore combined), a structured interview was conducted to determine the extent to which the participants had continued to exercise offsite over the past 4 months. Correlational and multiple regression analyses examined the influence of the combined measure of task and self-regulatory efficacy (i.e., the participant's confidence with respect to participating in offsite exercise at least 3 times per week, for 30 minutes or more at their prescribed heart rate over a 3 month period) and behavioural (e.g., past exercise frequency and intensity) parameters upon adherence to offsite exercise. Correlational analyses revealed that participants who had greater combined task and self-regulatory efficacy and had attended more exercise sessions during the formal onsite program reported greater adherence to offsite exercise during the 4 months post-program. In contrast, multiple regression analyses revealed that only the combined measure of task and self-regulatory efficacy explained a significant proportion of unique variance in relation to offsite exercise adherence 4 months following the cessation of the formal onsite exercise program ($R^2 = .13, p < .01$). In sum, task self-efficacy (combined with self-regulatory efficacy in one study) was found to be an important predictor of sustained offsite exercise adherence in all three studies. Thus, whereas self-regulatory efficacy has been found to be a particularly important predictor of onsite exercise adherence, task self-efficacy appears to be an especially important predictor of adherence to offsite exercise.

Despite the significant relationship between self-efficacy and sustained exercise adherence, McCaul and colleagues (1992) have suggested that self-efficacy in and of itself cannot explain why certain behaviours (e.g., exercise adherence) are maintained. Specifically, both task and self-regulatory efficacy have demonstrated significant but often not greater than moderate relationships ($R^2\Delta$ = .04 to .26) with exercise adherence patterns (e.g., Dzewaltowski, 1989; Kavanagh et al., 1993; McAuley, 1993; Rodgers & Brawley, 1993; Taylor et al., 1985). Thus, it addition to self-efficacy, Rothman (2000) has suggested that outcome satisfaction may enhance researchers' ability to predict sustained exercise adherence. The outcome satisfaction approach is premised upon the fact that people will maintain a particular behaviour (e.g., exercise) only if they are satisfied with what they have already accomplished. A review of the exercise adherence literature pertaining to the outcome satisfaction approach will be presented in the proceeding section.

Outcome Satisfaction

Because the majority of research to date has focused on the processes underlying the initiation of behaviour change, little empirical data are available to evaluate the hypothesis that behavioural maintenance is guided by perceived satisfaction with obtained outcomes. One of the few studies to examine outcome satisfaction surveyed individuals who had maintained a change in their behaviour over an extended period of time and found that individuals who were successful reported a high degree of satisfaction with how the change had affected their lives (e.g., Klem, Wing, McGuire, Seagle, Hill, 1997). Similarly, Rothman & Jeffery (1998) found that women who maintained weight losses one year following the cessation of a behavioural treatment program attributed greater benefits to having lost the weight than did women who failed to maintain their weight loss. Interestingly, successful and unsuccessful maintainers did not differ in their initial weight nor the amount of weight lost during the treatment program. This finding suggests that in comparison to unsuccessful maintainers, successful maintainers may have experienced a greater sense of satisfaction upon losing weight and this greater sense of satisfaction may have in turn motivated the successful maintainers to continue exercising and to perceive greater benefits in relation to their maintained weight losses.

Another study (Urban, White, Anderson, Curry, Kristal, 1992) examined whether women's personal experiences during the intervention component of the Women's Health Trial predicted long-term adherence to a low-fat diet. Findings indicated that women who reported great costs associated with following the diet and strong feelings of dissatisfaction with low-fat foods had poor rates of long-term adherence to the low-fat diet. In contrast, those women who reported great satisfaction with low-fat foods and few costs associated with following the diet were more successful adherers.

With regard to the CAD population, Frenn and colleagues (1989) conducted a qualitative study involving interviews with ten CAD patients to examine the client perspective on lifestyle changes following the acute phase of exercise-based cardiac rehabilitation. Specifically, clients were asked to describe their health, what they saw as important in improving or maintaining their health, any changes they had made to improve their health, and the factors that made these changes easier or more difficult. In accordance with the outcome satisfaction approach (Rothman, 2000), one of the most prominent findings was that those who viewed the changes due to cardiac rehabilitation as helping them to enjoy life (e.g., outcome satisfaction) were more encouraged to maintain lifestyle changes, such as sustained offsite exercise adherence, in comparison to those who did not share the same perspective.

Also in support of the outcome satisfaction approach, Williams and Lord (1995) measured self-perceived improvement in physical function and psychosocial well-being following 10 weeks of a 12-month onsite exercise intervention among 102 women aged 60-85 years. Perceptions of improvement in physical and psychosocial outcomes at 10 weeks were positively correlated with the number of onsite exercise sessions completed over the 12-month trial (correlations between adherence and the various indices of function and well-being ranged from $r = .15$ to $r = .39$). In addition, multiple regression analyses revealed that self-reported improvement in strength, actual strength and psychosocial well-being best predicted sustained offsite exercise adherence following the 12-month trial.

Finally, Neff and King (1995) examined the relationship between initial expectations of physical and psychosocial benefits from exercise, whether those expectations were met, and subsequent adherence to a 1-year onsite exercise program. Participants included 120 women and 149 men aged 50 to 65 years. Outcome measures included a baseline questionnaire, which assessed expected benefits due to exercise, actual physical fitness (measured at baseline and 6 months by a symptom-limited treadmill test), perceptions of actual change in expected benefits (measured at 6 months) and exercise adherence (monthly exercise log books). To understand the interactions between expected benefits, change at month 6, and 7-12 month adherence, four expectation groups were created: participants who scored above the sample median on expected benefits and below the sample median on perceived 6 month change (disappointed optimists); participants who scored above the median on both measures (optimistic realists); participants who scored below the median on expected benefits and above the median on perceived 6 month change (surprised pessimists); and participants who scored below the median on both measures (pessimistic realists). Analysis of variance (ANOVA) indicated that those participants who had low initial expectations regarding change in the physical and psychosocial benefits of exercise but high perceptions of change in these variables at 6 months (e.g., surprised pessimists) had greater exercise adherence during months 7-12 than did the other three expectation groups ($p < .01$). With regard to change in actual physical fitness, those who had high initial expectations for physical fitness change at baseline but low actual fitness change at month 6 (e.g., disappointed optimists) had lower exercise adherence during months 7-12 than did the other three expectation groups ($p < .001$). Thus, the results of this study suggest that initial expectations taken in conjunction with whether those initial expectations were *satisfied* is a significant predictor of subsequent exercise adherence. In summary, the findings with respect to the outcome satisfaction approach have indicated that perceptions of satisfaction in relation to both the physical and psychosocial outcomes of exercise are significantly related to sustained adherence to both onsite as well as to offsite exercise regimens.

Self-Efficacy and Outcome Satisfaction

In contrast to self-efficacy (task and self-regulatory) alone, the combination of self-efficacy and outcome satisfaction may result in the greatest predictive power with respect to sustained exercise adherence. In support of combining these two theoretical approaches in the prediction of exercise adherence, Bandura (1986; 1997) has suggested that self-efficacy contributes to behavioural motivation in several ways, one of them being shaping the outcomes expected from one's efforts. For example, people who perceive themselves as highly efficacious will expect favorable (e.g., satisfying) outcomes, whereas those with less confidence in their performance capabilities will envision negative (e.g., unsatisfying) outcomes. Bandura and Schunk (1981) have also proposed that the self-satisfaction gained from progressive mastery self-efficacy experiences (e.g., mastery efficacy experiences are gained from repeated *successful* performance of a particular behaviour) and the fulfillment of personal challenges serves as another enduring behavioural motivator.

Relating the aforementioned concepts to sustained exercise adherence, Dzewaltowski (1989) has suggested that the incentive to adhere to an exercise regimen is greater among individuals who are confident in their abilities to obtain the expected outcomes of exercise and who are satisfied with those outcomes, than those who are not confident and who are not satisfied with respect to exercise outcomes. The proceeding section will review the two studies that have examined the combined predictive utility of self-efficacy and outcome satisfaction in the prediction of sustained exercise adherence.

Bock and colleagues (2001) examined the predictors of offsite exercise adherence following completion of a 6-month onsite exercise program among 150 sedentary middle-aged men. The study measures included the 7 day Physical Activity Recall (Sallis et al., 1985), perceived benefits and barriers associated with exercise adherence (e.g., outcome satisfaction), task self-efficacy, depression (CES-D; Weissman, Sholomskas, Pottenger, Prusoff, Locke, 1977) and the positive and negative affect schedule (PANAS; Watson, Clark, Tellegen, 1988), which were administered 6 months following the cessation of the onsite program (e.g., month 12). Results revealed that participants who adhered to high levels of offsite exercise reported less depression, higher task self-efficacy, and were less likely to perceive significant barriers following the cessation of the onsite exercise program as compared to those who did not engage in offsite exercise. Although not statistically significant, consistent with the outcome satisfaction approach, those participants who maintained high levels of offsite exercise adherence also associated greater perceived benefits with exercise participation than those who did not.

Dzewaltowski (1989) prospectively examined the strength of barriers self-efficacy, outcome expectations, and outcome satisfaction in the prediction of offsite exercise participation over a period of 7 weeks among 328 undergraduates involved in a variety of physical education skills courses (e.g., advanced fitness, advanced volleyball). Correlational analyses revealed a significant positive relationship between barriers self-efficacy and exercise adherence over the 7-week period ($r = .34, p<.05$) such that the higher the participants' barriers self-efficacy the more days per week they participated in offsite exercise. Hierarchical multiple regression analyses revealed an additive effect of self-efficacy and outcome satisfaction in the prediction of exercise adherence. Specifically, both barriers self-efficacy and outcome satisfaction were significant predictors of exercise adherence over the 7-week period ($R^2\Delta = .14, p < .05$) such that the greater the participants' self-efficacy towards participating in exercise in the face of barriers and the greater their satisfaction with received exercise outcomes, the greater their exercise adherence. Also, outcome expectations and outcome satisfaction interacted ($R^2\Delta = .02, p < .05$), such that the greater the participants' beliefs that positive outcomes would occur from exercise participation and the greater the participants' satisfaction with received exercise outcomes (e.g., present body weight), the greater their adherence to offsite exercise. In summary, the findings of these two studies suggest that the combination of self-efficacy (both task and self-regulatory) and outcome satisfaction may be more predictive of sustained offsite exercise adherence than self-efficacy alone. Unfortunately, there is no research to date examining both self-efficacy and outcome satisfaction in relation to onsite exercise adherence.

Summary and Hypotheses

CAD is the leading cause of mortality among Canadian men and women, and is also a significant cause of morbidity. Exercise-based cardiac rehabilitation has been found to be an effective strategy in improving both the physiological and the psychosocial well-being of individuals with CAD. In addition, individuals with documented CAD who adhere to formal onsite cardiac rehabilitation as well as to offsite exercise with the goal of accumulating at least 30 minutes of mild to moderate exercise most days of the week, have been found to gain the greatest cardioprotective benefits.

Unfortunately, following the acute phase of cardiac rehabilitation (e.g., 0-6 months post-cardiovascular event), offsite exercise often becomes the only option to the majority of cardiac patients, as very few formal maintenance cardiac rehabilitation programs exist. Given that onsite cardiac rehabilitation plays a key role in the promotion of adherence to offsite exercise (Wenger et al., 1995), it is not surprising to see that among patients who discontinue supervised onsite cardiac rehabilitation (either during or after the acute phase of cardiac rehabilitation), less than 25% continue to exercise offsite at levels that will maintain or improve cardiorespiratory fitness (Daltroy, 1985; Radtke, 1989). Thus, given the paucity of maintenance cardiac rehabilitation exercise training programs, strategies are needed to encourage sustained offsite exercise adherence following the termination of formal onsite cardiac rehabilitation programs. Among the very few studies examining sustained exercise adherence among the clinical cardiac population in particular, as well as among asymptomatic populations, self-regulatory efficacy has been found to be a particularly important predictor of onsite exercise adherence. In contrast, task self-efficacy has been found to be an especially important predictor of offsite exercise adherence. In addition to self-efficacy, outcome satisfaction has been found to be a significant predictor of sustained adherence to both offsite and onsite exercise. Finally, although the existing research is minimal, the combination of self-efficacy (both task and self-regulatory) and outcome satisfaction may be more predictive of sustained exercise adherence than self-efficacy alone.

As a result of the lack of research regarding sustained exercise adherence in the clinical cardiac population, a number of questions remain unanswered. First, the role of self-efficacy in the prediction of sustained exercise adherence among individuals with documented CAD is unclear. Specifically, there are no studies to date that have attempted to elucidate the relationship between self-efficacy (both task and self-regulatory) and adherence to both the onsite and offsite components of the maintenance cardiac rehabilitation exercise prescription. Second, the predictive utility of self-efficacy and outcome satisfaction combined, in relation to sustained exercise adherence has yet to be examined in the CAD population. The following study is a preliminary attempt to answer these questions.

The purpose of the present study was to examine self-efficacy and outcome satisfaction in the prediction of sustained adherence to the maintenance cardiac rehabilitation exercise prescription among men with documented CAD. With regard to self-efficacy, it was hypothesized that whereas self-regulatory efficacy would be a significant predictor and would also explain a significant amount of variance in onsite exercise adherence, task self-efficacy would not. In contrast, it was hypothesized that whereas task self-efficacy would be a significant predictor and would also explain a significant amount of variance in offsite exercise adherence, self-regulatory efficacy would not. Finally, it was hypothesized that both self-regulatory efficacy and task self-efficacy would be significant predictors and would also explain a significant amount of variance in total exercise adherence (e.g., onsite and offsite adherence). With regard to outcome satisfaction, it was hypothesized that it would explain variance in exercise adherence (onsite, offsite and total) beyond that explained by self-efficacy (task and self-regulatory) alone.

Method

Participants

The study sample consisted of men ($N = 101$) ranging in age from 53 to 86 years of age, with a mean age of 68.15 ± 8.03 years. Participants had been diagnosed with CAD and were members of a maintenance cardiac rehabilitation exercise program. Patients in this program are prescribed a daily exercise regimen (based upon their prescribed training heart rate) including twice weekly supervised onsite exercise sessions lasting an average of 1-2 hours in addition to at least three 30 minute offsite exercise sessions per week. All participants had completed the acute phase of cardiac rehabilitation (i.e., they had participated in cardiac rehabilitation for at least 6 months), were deemed clinically stable and their medications were monitored and controlled. Participants were verbally recruited from the cardiac rehabilitation program on a one to one basis, as well as by means of posters (see Appendix A), which were placed in various locations throughout the rehabilitation center. Of the 150 men in the maintenance cardiac rehabilitation program who were eligible for the study, 110 volunteered to participate and 101 completed and returned all of the study measures. Demographic characteristics of the 101 volunteers are presented in Table 1.

Materials

All participants completed a battery of questionnaires, which assessed demographic characteristics, as well as the five study measures of interest. All questionnaires are described below, and are presented in Appendix C.

Demographic questionnaire. The demographic questionnaire was used to assess the participants' age, height, weight, ethnic background, type of cardiovascular event, years post-cardiovascular event, number of years involved in cardiac rehabilitation, education, smoking status, previous exercise history, beliefs regarding exercise maintenance, and fear of over-exercising. These data (see Table 1) were collected for descriptive purposes as well as for use as potential covariates in study analyses.

Task Self-Efficacy. The participants' confidence in their ability to perform the elemental physical aspects of exercise was measured using the Cardiac Exercise Self-Efficacy Instrument (CESEI; Hickey, Owen, Froman, 1992; Appendix C). The CESEI is a 16-item self-report inventory with anchors ranging from 1 *(very little confidence)* to 5 *(quite a lot of confidence)*. A total task self-efficacy score was calculated by summing the confidence ratings on each of the 16 items, resulting in minimum and maximum scores of 16 and 80 respectively. Sample items included "please circle the number that best represents how much confidence you have about: Warming up before exercise; Taking [your] heart rate before and after exercise". The CESEI has demonstrated good internal consistency among a sample of 50 cardiac rehabilitation participants wherein the alpha reliability coefficient was $\alpha = 0.87$ (Hickey et al., 1992).

Self-Regulatory Efficacy

Scheduling Self-Efficacy. The participants' confidence in their ability to organize, plan, and schedule regular exercise bouts into their daily life was assessed using the 8-item scheduling self-efficacy scale (Gyurcsik, 1999; Appendix C). The scheduling self-efficacy scale is an 8-item self-report inventory with anchors ranging from 0% *(not* *confident)* to 100% *(completely confident)*. A total scheduling self-efficacy score was calculated by summing the confidence ratings and dividing by the total number of items in the scale, resulting in minimum and maximum scores of 0 and 100 respectively. Sample items included "State your confidence in your abilities to perform the following behaviours regularly during the next 4 weeks so that you exercise most days of the week (e.g., MacTurtles twice per week in addition to exercising on your own): Plan and prepare in advance so nothing interferes with my exercise time; Rearrange my schedule so that I can fit my exercise sessions into my daily routine". This measure has previously exhibited good internal consistency in a sample of 160 asymptomatic individuals (i.e., 14-74 yrs; $\alpha = .93$; Gyurcsik, 1999).

Barriers Self-Efficacy. The participants' confidence in their ability to exercise regularly in the face of barriers or obstacles was assessed using the 13-item Barriers Self-Efficacy scale (McAuley, Poag, Gleason, Wraith, 1990; Appendix C). The barriers self-efficacy scale is a 13-item self-report inventory with anchors ranging from 0% *(not confident)* to 100% *(completely confident)*. A total barriers self-efficacy score was calculated by summing the confidence ratings and dividing by the total number of items in the scale, resulting in minimum and maximum scores of 0 and 100 respectively. Sample items included "Over the next four weeks, I believe that I could exercise on most days (i.e., MacTurtles twice per week in addition to exercising on my own) if: The weather was very bad (rain, snow, cold, ice); The instructor or leader did not offer me any encouragement." This measure has demonstrated good internal consistency among a sample of active middle-aged adults ($\alpha = .92$; McAuley, Lox, Rudolph, Travis, 1994).

Outcome Satisfaction. The participants' satisfaction with physiological and psychosocial exercise outcomes was assessed using the Satisfaction Questionnaire (developed in part by borrowing items from the Adult Body Satisfaction Questionnaire; Reboussin et al., 2000; Appendix C). The satisfaction questionnaire is a 17-item self-report inventory that was developed for specific use in the present study. Scale anchors ranged from 1 *(very dissatisfied)* to 6 *(very satisfied)*. A total outcome satisfaction score was calculated by summing the satisfaction ratings on each of the 17 items, resulting in minimum and maximum scores of 17 and 102 respectively. Sample items included "Over *the past 6 months* how satisfied have you been with the effects of exercise on the length of time that you can exercise before experiencing cardiac symptoms such as angina, shortness of breath, or dizziness?" and "Over *the past 6 months* how satisfied have you been with the effects of exercise on how you feel about yourself?"

Since the internal consistency of the Satisfaction Questionnaire among individuals with CAD is not known, a pilot study was conducted prior to the primary investigation to test its psychometric properties. A sample of 14 men (*M* age = 68.68 $\pm$ 10.17) who were participants in an exercise-based cardiac rehabilitation program were recruited to participate. Because these participants were recruited from the same cardiac rehabilitation program that our primary study participants were recruited from, men who had been involved in the program for greater than six months were excluded from the pilot study (i.e., we wanted to keep these participants for the primary investigation). Thus, 14 men who were close to completing the acute phase of the cardiac rehabilitation program (*M* months in the program = 4.11 ± 1.04) were administered the Satisfaction Questionnaire in a one-to-one interview format (see Appendix B).

During the interview, participants were asked to evaluate the content of the questionnaire in terms of its meaningfulness, readability, comprehensiveness and potential redundancy. Results of the pilot study revealed that although the questionnaire was designed to assess the participants' "satisfaction with the effects of exercise" on various exercise outcomes, they often responded to the questions with regard to their satisfaction with the outcomes in general (i.e., they did not relate their satisfaction with the outcomes to their participation in exercise). Thus, to ensure that participants answered the questions with respect to their satisfaction with exercise outcomes, the stem "Over *the past 6 months* how satisfied have you been with the effects of exercise on…" was included at the beginning of each item in the revised version of the questionnaire. In addition, items 1 through 4 on the questionnaire were consistently identified by participants as being not meaningful (i.e., satisfaction with the effects of exercise on resting blood pressure, resting heart rate, blood cholesterol and blood lipids) and were therefore removed. Finally, item 11 (e.g., satisfaction with the effects of exercise on overall mood) was also removed as it was negatively correlated with the other items on the scale (r = -.30). Thus, after removing the aforementioned 5 items from the questionnaire, the reliability of the revised 12-item scale was assessed and was found to have good internal consistency (α = 0.80). Thus, the revised 12-item Satisfaction Questionnaire was used in the present investigation (see Appendix C). A total outcome satisfaction score was calculated by summing the satisfaction ratings on each of the 12 items, resulting in minimum and maximum scores of 12 and 72 respectively.

Exercise Adherence. Exercise adherence was assessed by means of four weekly exercise tracking tables, which assessed the participants' self-reported exercise type (onsite or offsite) mode, frequency and duration. In accordance with the maintenance cardiac rehabilitation exercise prescription, only those exercise bouts that were aerobic in nature for a duration of at least 30 minutes were considered in the analyses. Participants received the exercise tracking tables on a weekly basis, such that when they completed the first weekly exercise tracking table, they returned it to the researcher in exchange for the second weekly exercise tracking table. Although these exercise tracking tables were designed for specific use in this study, several previous studies have also used exercise logs to prospectively track exercise adherence in the CAD population (e.g., Carlson et al., 2001; Brubaker et al., 2000; Young, King, Sheehan, Stefanick, 2002). Onsite exercise adherence was calculated as a sum (of onsite exercise sessions attended over the 4-week study period) as well as a percentage (based upon the onsite exercise prescription of 2 days per week). Offsite exercise adherence was also calculated as a sum (of offsite exercise sessions attended over the 4-week study period) as well as a percentage (based upon the offsite exercise prescription of at least 3 days of 30 minutes of aerobic exercise per week). Finally, total exercise adherence was calculated as a sum (of both onsite and offsite exercise sessions attended over the 4-week study period) as well as a percentage (based upon both onsite and offsite exercise prescriptions).

Design and Procedure

The present study employed a self-report, nonexperimental, prospective design. The five study measures were task self-efficacy, self-regulatory efficacy (operationalized as barriers self-efficacy and scheduling self-efficacy), outcome satisfaction, and 4-week onsite, offsite and total exercise adherence.

Assessment of Baseline Measures

Upon expressing interest in participating in the study, participants were asked to read a study information sheet (see Appendix A) informing them of the specific study details including the fact that by completing the study measures, they have provided informed consent. The researcher also highlighted certain aspects of the information sheet including anonymity, confidentiality, and their right to withdraw from the study at any time. Subsequently, participants were given instructions regarding completion of the baseline measures (i.e., demographic questionnaire, task self-efficacy, barriers self-efficacy, scheduling self-efficacy, and outcome satisfaction), which were administered in a counterbalanced manner to prevent carry-over and order effects. Specifically, participants were instructed to complete the 5 questionnaires at home (according to the order in which they were administered) and then return them to the researcher at the rehabilitation centre during their next weekly cardiac rehabilitation exercise session 48 hours to 1-week later.

Assessment of Exercise Adherence

Following completion of the 5 baseline measures (i.e., 48 hours to one week later), participants were provided with instructions regarding the four weekly exercise tracking tables (see Appendix C). Specifically, the researcher explained to the participants that they would be required to complete four weekly exercise tracking tables, one each week for the next consecutive 4 weeks. Each exercise tracking table assessed the participants' self-reported exercise type (onsite or offsite), mode, frequency, and duration. Once participants had completed the first weekly exercise tracking table, they were asked to return it to the researcher at the cardiac rehabilitation centre in exchange for the second weekly exercise tracking table. Participants were asked to continue the above process, returning the previous weekly table to the researcher in exchange for the next weekly table until they had completed all 4 exercise tracking tables (i.e., 4-week total time period). The above-described process was intended to facilitate accurate completion of the four weekly exercise tracking tables such that following completion of each weekly exercise tracking table, participants could ask the researcher questions / seek clarification and vice versa. Having the participants complete one table at a time as opposed to sending them away with all 4 tracking tables at once (to be collected at the end of the 4 weeks) also served to minimize potential recall bias.

Upon completion of the study, participants were thanked for their participation and were provided with a summary of the investigative findings, which was posted in various locations throughout the cardiac rehabilitation centre (see Appendix D)

Results

Internal Consistency of the Scales

The internal consistency of the scales was determined by calculating Cronbach's alpha reliability coefficients (see Table 3). Those exceeding the .70 alpha criterion were considered to be reliable (Nunnally, 1978). With the exception of one scale (Scheduling Self-Efficacy, $\alpha = .66$), the measures were reliable. However, the internal consistency of the Scheduling Self-Efficacy Scale was excellent at $\propto = .92$ when the item "Put in 2 exercise sessions at MacTurtles each week at equally spaced intervals (e.g., Monday & Wednesday or Tuesday & Thursday)" was removed. As a result, subsequent analyses using the Scheduling Self-Efficacy Scale did not include the aforementioned item. Thus, overall scale reliabilities ranged from $\propto = .84$ to .92.

Descriptive Statistics

The mean, standard deviation, and observed range for the participant demographics and the study variables including task self-efficacy (CESEI), scheduling self-efficacy, barriers self-efficacy, outcome satisfaction and exercise adherence are presented in Tables 1 and 2 respectively.

Correlational Analyses

Two-tailed Pearson product moment correlation coefficients were calculated to examine the relationships between exercise adherence (i.e., % of prescribed exercise sessions attended) and participant demographics (see Table 4) and exercise adherence and the study variables (see Table 5). First, in order to determine whether any significant study covariates existed, correlations were computed between exercise adherence and participant demographics. Significant positive correlations were found between offsite exercise adherence and (1) days of exercise per week pre-cardiovascular event ($r = .22, p < .05$) as well as (2) days of exercise per week believed necessary to maintain cardiovascular health ($r = .47, p < .01$). Significant positive correlations were also found between total exercise adherence and (1) days of exercise per week pre-cardiovascular event ($r = .23, p < .05$) as well as (2) days of exercise per week believed necessary to maintain cardiovascular health ($r = .43, p < .01$). Thus, days of exercise per week pre-cardiovascular event, and days of exercise per week believed necessary to maintain cardiovascular health were entered as covariates into the subsequent hierarchical regression models for both offsite and total exercise adherence (see *Hierarchical Multiple Regression Analyses* section).

Second, prior to conducting hierarchical multiple regression analyses, correlations were computed to examine the relationships between exercise adherence (i.e., % of prescribed exercise sessions attended) and the study variables. A significant positive correlation was found between onsite exercise adherence and scheduling self-efficacy ($r = .41, p < .01$). Significant positive correlations were also found between offsite exercise adherence and task self-efficacy (CESEI; $r = .48, p < .01$), scheduling self-efficacy ($r = .43, p < .01$) and barriers self-efficacy ($r = .27, p < .01$). Similarly, significant positive correlations were found between total exercise adherence and task self-efficacy (CESEI; $r = .49, p < .01$), scheduling self-efficacy ($r = .52, p < .01$) and barriers self-efficacy ($r = .29, p < .01$).

Hierarchical Multiple Regression Analyses

Predicting Onsite Exercise Adherence. A hierarchical multiple regression analysis was performed to test the hypothesis that while self-regulatory efficacy (e.g., scheduling and barriers self-efficacy) would be a significant predictor and would also explain a significant amount of variance in onsite exercise adherence, task self-efficacy would not. The hypothesis that outcome satisfaction would predict variance in onsite exercise adherence beyond that accounted for by self-efficacy was also tested. Onsite exercise adherence (i.e., the outcome variable) was entered into the regression model as the percent of onsite prescribed exercise sessions attended during the 4-week study period. The order of entry of the predictor variables into the regression analysis is presented in Table 6 and was determined based upon theoretical predictions (Bandura, 1986, 1997; Rothman, 2000). First, task self-efficacy was entered into the model to test for a main effect of this variable on adherence to onsite exercise adherence. Second, scheduling and barriers self-efficacy, the two measures of self-regulatory efficacy, were entered into the model simultaneously to test for main effects of these variables on adherence to onsite exercise. Finally, outcome satisfaction was entered into the model to test for a main effect of this variable on adherence to onsite exercise after task and both measures of self-regulatory efficacy had been accounted for.

According to the results of the hierarchical multiple regression analysis, the overall model was significant $R^2 = .19$ ($R^2_{adj} = .16$), $F\,(4, 96) = 5.72, p < .001$ (see Table 6). As predicted, a significant main effect was found for self-regulatory efficacy ($R^2\Delta = .17, p = .001$). Upon inspection of the beta weights, only the scheduling measure of self-regulatory efficacy was a significant predictor of adherence to onsite exercise ($\beta = .57, p = .001$). Also consistent with hypothesis, task self-efficacy did not explain a significant amount of variance in adherence to onsite exercise ($R^2\Delta = .02, p = .13$) and the beta weight indicated that it was not a significant predictor of onsite adherence either ($\beta = -.11, p = .35$). Contrary to hypothesis, there was no significant main effect for outcome satisfaction ($R^2\Delta = .00, p = .75$), and upon inspection of the beta weight, outcome satisfaction was not a significant predictor of onsite exercise adherence ($\beta = -.03, p = .75$).

Predicting Offsite Exercise Adherence. A hierarchical multiple regression analysis was performed to test the hypothesis that while task self-efficacy would be a significant predictor and would also explain a significant amount of variance in onsite exercise adherence, self-regulatory efficacy (e.g., scheduling and barriers self-efficacy) would not. The hypothesis that outcome satisfaction would predict variance in offsite exercise adherence beyond that accounted for by self-efficacy was also tested. Offsite exercise adherence (i.e., the outcome variable) was entered into the regression model as the percent of prescribed offsite exercise sessions attended during the 4-week study period. The order of entry of the predictor variables into the regression analysis is presented in Table 7. First, covariates including days of exercise per week pre-cardiovascular event and exercise beliefs (e.g., days of exercise per week believed necessary to maintain cardiovascular health) were entered to control for the observed relationships between these two variables and offsite exercise adherence ($r = .22, p < .05$ and $r = .47, p < .01$ respectively). Second, task self-efficacy was entered to test for a main effect of this variable on adherence to offsite exercise. Third, scheduling and barriers self-efficacy, the two measures of self-regulatory efficacy, were entered to test for main effects of these variables on adherence to offsite exercise adherence. Finally, outcome satisfaction was entered into the model to test for a main effect of this variable on adherence to offsite exercise adherence after the covariates, task self-efficacy and both measures of self-regulatory efficacy had been accounted for.

According to the results of the hierarchical multiple regression analysis, the overall model was significant $R^2 = .36$ ($R^2_{adj} = .33$), $F(6, 92) = 8.85, p < .001$ (see Table 7). While days of exercise per week pre-cardiovascular event and exercise beliefs accounted for a significant amount of variance in offsite exercise adherence ($R^2\Delta = .25, p = .001$), inspection of the beta weights indicated that only exercise beliefs significantly predicted offsite exercise adherence ($\beta = .30, p = .002$). As predicted, a significant main effect was found for task self-efficacy ($R^2\Delta = .09, p = .001$). Inspection of the beta weight for task self-efficacy indicated that it was also a significant predictor of adherence to offsite exercise ($\beta = .24, p = .04$). Also consistent with hypothesis, self-regulatory efficacy did not explain a significant amount of variance in offsite exercise adherence ($R^2\Delta = .02, p = .18$). The beta weights associated with the two measures of self-regulatory efficacy were also nonsignificant ($\beta = .19, p = .13$ [scheduling], $\beta = .01, p = .96$ [barriers]) indicating that as predicted, self-regulatory efficacy was not a significant predictor of adherence to offsite exercise. Contrary to hypothesis, there was no main effect for outcome satisfaction ($R^2\Delta = .00, p = .98$), and upon inspection of the beta weight, outcome satisfaction was not a significant predictor of onsite exercise adherence ($\beta = -.00, p = .98$).

Predicting Total Exercise Adherence. A hierarchical multiple regression analysis was performed to test the hypothesis that both task and self-regulatory efficacy would be significant predictors and would explain a significant amount of variance in total exercise adherence. The hypothesis that outcome satisfaction would account for variance in total exercise adherence beyond that accounted for by self-efficacy was also tested. Total exercise adherence (i.e., the outcome variable) was entered into the regression model as the percent of prescribed total exercise sessions attended (i.e., onsite and offsite exercise combined) during the 4-week study period. The order of entry of the predictor variables into the regression analysis is presented in Table 8. First, covariates including days of exercise per week pre-cardiovascular event and exercise beliefs (e.g., days of exercise per week believed necessary to maintain cardiovascular health) were entered to control for the observed relationships between these two variables and total exercise adherence ($r = .23, p < .05$ and $r = .43, p < .01$ respectively). Second, task self-efficacy was entered to test for a main effect of this variable on adherence to total exercise. Third, scheduling and barriers self-efficacy, the two measures of self-regulatory efficacy, were entered to test for main effects of these variables on adherence to total exercise adherence. Finally, outcome satisfaction was entered into the model to test for a main effect of this variable on adherence to total exercise adherence after the covariates, task self-efficacy and both measures of self-regulatory efficacy had been accounted for.

According to the results of the hierarchical multiple regression analysis, the overall model was significant $R^2 = .41$ ($R^2_{adj} = .37$), $F(6, 92) = 10.61, p < .001$ (see Table 8). While days of exercise per week pre-cardiovascular event and exercise beliefs accounted for a significant amount of variance in total exercise adherence ($R^2\Delta = .23, p = .001$), inspection of the beta weights indicated that only exercise beliefs significantly predicted total exercise adherence ($\beta = .25, p = .009$). As predicted, significant main effects were found for both task self-efficacy and self-regulatory efficacy ($R^2\Delta = .11, p = .001$ and R^2 change = $.07, p = .01$ respectively). However upon inspection of the beta weights, only task self-efficacy and the scheduling measure of self-regulatory efficacy were significant predictors of total exercise adherence ($\beta = .21, p = .04$ [task], $\beta = .35, p = .004$ [scheduling]). Contrary to hypothesis, there was no main effect for outcome satisfaction ($R^2\Delta = .00, p = .91$), and upon inspection of the beta weight, outcome satisfaction was not a significant predictor of total exercise adherence ($\beta = -.01, p = .91$).

Discussion

This study examined self-efficacy and outcome satisfaction in the prediction of sustained adherence to the maintenance cardiac rehabilitation exercise prescription among men with documented CAD. Although the results of the present study supported the predictive utility of self-efficacy in relation to sustained exercise adherence among men with CAD, they did not support outcome satisfaction as a predictor. First, when predicting adherence to onsite exercise, scheduling self-efficacy (one measure of self-regulatory efficacy) explained the greatest amount of variance and was the most salient predictor of onsite adherence. Second, when predicting adherence to offsite exercise, both exercise beliefs (i.e., days of exercise per week believed necessary to maintain cardiovascular health) and task self-efficacy accounted for a significant amount of variance and were both significant predictors of offsite adherence. Third, when predicting total exercise adherence, exercise beliefs, task self-efficacy and scheduling self-efficacy all explained significant variance and were all significant predictors of total exercise adherence. Finally, with regard to outcome satisfaction, it did not explain significant variance nor was it a significant predictor in relation to onsite, offsite or total exercise adherence.

Taken together, these findings suggest that self-efficacy and exercise beliefs are particularly important predictors of sustained adherence to the maintenance cardiac rehabilitation exercise prescription among men with CAD. The following sections will discuss the results of the present study in relation to onsite, offsite and total exercise adherence, as well as clinical implications, study limitations and directions for future research.

Onsite Exercise Adherence

Consistent with hypothesis, self-regulatory efficacy, but only the scheduling measure, was found to be a significant predictor of onsite exercise adherence while task self-efficacy was not. Self-regulatory efficacy also accounted for a significant amount of variance in onsite exercise adherence while task self-efficacy did not. This finding suggests that participants' confidence in their ability to organize, plan, and schedule regular exercise bouts into their lives was a more important factor influencing their adherence to the onsite component of the maintenance cardiac rehabilitation exercise prescription than their confidence in their ability to perform the elemental physical aspects of the exercise prescription.

In support of this finding, previous studies (albeit among asymptomatic populations) examining the relationship between self-efficacy and adherence to onsite exercise have found self-regulatory efficacy to be a particularly important predictor (Garcia & King, 1991; Rodgers et al., 2002). One possible explanation for this finding in the present study is that when patients with CAD engage in onsite exercise they are supervised by trained health care professionals. As such, they are probably confident that they are in "good hands" should the need for emergency treatment arise while they are exercising. In addition, patients are most likely confident in their ability to successfully perform the elemental physical aspects of the exercise prescription, because a health care professional is there to tell them if they are doing something in an incorrect and / or unsafe manner. Finally, participants in the present study had been exercising in an onsite cardiac rehabilitation program for an average of 5.35 years, which may also bolster their onsite task self-efficacy. Specifically, during their years of participation in onsite exercise, participants most likely gained mastery self-efficacy experiences with the task (i.e., onsite exercise) resulting in enhanced onsite task self-efficacy. Thus, when exercising onsite, patients are likely to feel relatively efficacious with respect to performing the elemental physical aspects of exercise (i.e., high task self-efficacy) and hence task self-efficacy may have little bearing on whether they adhere to onsite exercise or not. In contrast, patients' confidence in their ability to overcome exercise-related barriers and scheduling conflicts is still likely to determine whether they adhere to the onsite exercise prescription.

Interestingly, in the present study, only the scheduling measure of self-regulatory efficacy was found to be a significant predictor of onsite exercise adherence. Given that the mean age of the study population is representative of the mean retirement age of the general population, this finding for scheduling self-efficacy may be understood with respect to the well-known retirement "busy ethic" (Bosse, Ekerdt, Silbert, 1984; Ekerdt, 1986). According to Ekerdt (1986) there is a way that people talk about retirement that emphasizes the importance of being busy. It represents people's attempts to justify retirement in terms of their long-standing beliefs and values. It has been suggested that retirement is morally managed and legitimized on a day-to-day basis in part by an ethic that esteems leisure that is earnest, occupied, and filled with activity - a "busy ethic" (Bosse et al., 1984; Ekerdt, 1986). The busy ethic is named after the common question posed to individuals of retireable age, "What will you do (or are you doing) to keep yourself busy?" and their equally common responses that "I have a lot to keep me busy" and "I'm as busy as ever" (Ekerdt, 1986). Retirees have also been known to corroborate their level of involvement using blanket terms such as "I've got plenty to do, I'm busier than when I was working"(Ekerdt, 1986). Consistent with these reports associated with the "busy ethic," participants in the present study who were on average, of retirement age, may have attributed a great deal of importance to their ability to successfully schedule their prescribed weekly onsite exercise sessions. Thus, perhaps it was not surprising to see scheduling self-efficacy emerge as the most significant measure of self-regulatory efficacy in the prediction of adherence to the onsite component of the maintenance cardiac rehabilitation exercise prescription.

Offsite Exercise Adherence

With regard to offsite exercise adherence, one of the study covariates, Exercise Beliefs, emerged as the most salient predictor of adherence to offsite exercise adherence. This finding suggests that the number of days participants believed they needed to exercise per week to maintain cardiovascular health significantly influenced their adherence to the offsite component of the maintenance cardiac rehabilitation exercise prescription. Specifically, the more days per week participants believed they needed to exercise to maintain cardiovascular health, the greater their adherence to the offsite component of their exercise prescription. According to previous research, physicians have been found to have a significant influence upon the beliefs that individuals have with respect to engaging in exercise (Stephens, 1983). Indeed, the cardiac patients' likelihood of engaging in rehabilitative exercise has been found to be significantly correlated with the strength of the physician's advice (Ades, Waldmann, McCann, Weaver, 1992). Thus, given the observed relation between exercise beliefs and offsite exercise adherence in the present study, health care professionals working in the area of cardiac rehabilitation should recognize the important role that physicians may play with respect to the promotion of accurate offsite exercise beliefs.

As predicted, after controlling for the significant covariates (i.e., Exercise Days Pre-Cardiovascular Event & Exercise Beliefs) task self-efficacy was found to be a significant predictor of offsite exercise adherence, whereas self-regulatory efficacy was not. Task self-efficacy also accounted for a significant amount of the variance in offsite exercise adherence, whereas self-regulatory efficacy did not. This finding suggests that the participants' confidence in their ability to engage in the elemental physical aspects of the prescribed exercise regimen was a more important factor influencing their adherence to the offsite component of the maintenance cardiac rehabilitation exercise prescription than their confidence in their ability to exercise in the face of barriers and /or scheduling conflicts.

When participants exercise offsite, the health care professional is not there to monitor the participants' symptom status and task performance. Rather, the onus to monitor these things is placed solely upon the participant. Thus, perhaps it was not surprising to find that task-self-efficacy was a particularly important predictor of adherence to offsite exercise. Consistent with this finding, previous studies in both the cardiac and asymptomatic populations have found task self-efficacy to be a significant predictor of adherence to offsite exercise (McAuley, Lox, Duncan, 1993; Moore et al., 2002). In sum, the findings of the present study suggest that exercise beliefs and task self-efficacy are significant predictors of adherence to the offsite component of the maintenance cardiac rehabilitation exercise prescription.

Total Exercise Adherence

Similar to the findings for offsite exercise adherence, Exercise Beliefs, one of the study covariates, emerged as the most salient predictor of total exercise adherence. This finding suggests that the number of days per week that participants believed they needed to exercise to maintain cardiovascular health significantly influenced their adherence to the total maintenance cardiac rehabilitation exercise prescription (e.g., the onsite and offsite exercise prescription combined). Specifically, the more days per week participants believed they needed to exercise to maintain cardiovascular health, the greater their adherence to the total exercise prescription. As previously discussed, the role of the physician may be especially important in promoting accurate exercise beliefs regarding the total maintenance cardiac rehabilitation exercise prescription, which may in turn facilitate sustained adherence to this prescription.

Consistent with hypothesis, after controlling for the significant covariates (i.e., Exercise Days Pre-Cardiovascular Event & Exercise Beliefs), both task and self-regulatory efficacy (only the scheduling measure) were found to be significant predictors of total exercise adherence. This finding suggests that both task and self-regulatory efficacy are important factors influencing adherence to the total maintenance cardiac rehabilitation exercise prescription. Given that self-regulatory efficacy was found to be the most important predictor of onsite exercise adherence and that task self-efficacy was the most important predictor of offsite exercise adherence, this finding for total exercise adherence makes intuitive sense. Indeed, Rodgers and her colleagues (2002) have suggested that task self-efficacy should be considered a "necessary but not sufficient" condition for exercise adherence, and that self-regulatory efficacy is required for the maintenance of exercise behaviour. Similarly, Bandura (1990) has suggested that in order to produce enduring behavioural patterns (e.g., sustained exercise adherence) one must have some basic "skill" or task self-efficacy as well as self-efficacy for using those skills in the face of challenging situations (i.e., self-regulatory efficacy). Thus, consistent with the self-efficacy aspect of self-efficacy theory (Bandura, 1986) in order to successfully fulfill the total maintenance cardiac rehabilitation exercise prescription, participants in the present study needed to be confident in their ability to engage in the elemental physical aspects of the task and in their ability to schedule exercise into their daily lives.

Null Findings

Outcome Satisfaction. Contrary to hypothesis, after accounting for the significant study covariates and self-efficacy, outcome satisfaction did not predict significant variance in onsite, offsite, nor total exercise adherence. One explanation for this contrary finding is that when Rothman (2000) proposed the outcome satisfaction approach to studying behavioural maintenance, he did not account for potential differences in the appropriateness of this approach among individuals in the earlier (i.e., just completed the acute phase of cardiac rehabilitation) versus later stages (i.e., years of participation in cardiac rehabilitation) of behavioural_maintenance. Indeed, Rothman (2000) has addressed this potential limitation with his suggestion that further information about the natural history of the behaviour change process would be invaluable and would help delineate how the process of maintenance unfolds. It is further suggested by Rothman (2000) that this information would enable investigators to determine whether there is a point in time when people surpass the maintenance phase and can be said to have successfully terminated the process of behaviour change. For example, outcome satisfaction might be relevant in the early stage of behavioural maintenance when individuals are still changing, but not in the later stage when they have already changed. With respect to the present study, given that the participants had been involved in the maintenance cardiac rehabilitation program for an average of approximately five years, they may have successfully terminated the maintenance phase of behavioural change, and thus the outcome satisfaction approach may not have been appropriate in predicting their exercise adherence.

A second explanation for the null finding for outcome satisfaction is that the Satisfaction Questionnaire may not have tapped into the most important physiological and psychosocial exercise outcomes among participants. For instance, the questionnaire did not assess the effects that participating in exercise had on the participants' satisfaction with perceived social support, which has been found to be significantly associated with exercise adherence among the cardiac population. That having been said, the research to date on social support and exercise adherence among the cardiac population has yielded mixed results with some studies demonstrating a positive effect of social support on adherence (Craig, Lynch, Quartner, 2000; Dracup, 1994) and others a detrimental effect

(Angove, Brawley, Weston, 2002; Berkhuysen, Nieuland, Buunk, Sanderman, Rsipens, 1999). In addition, gender differences have been found in the general social support literature indicating that women tend to have larger and more interdependent social networks than men (Burda, Vaux, Schill, 1984; Ptacek, Smith, Dodge, 1994). Women also tend to value their social relationships more than men (Watkins et al., 1999). Thus, given that the present study sample was comprised solely of men, these findings suggest that social support may not have been a particularly important exercise outcome to participants after all. Nevertheless, there may have been other physiological and /or psychosocial exercise outcomes that were not included in the Satisfaction Questionnaire that could have potentially improved its predictive utility.

A third possible explanation for the lack of support in relation to outcome satisfaction is that men and women have been found to use different coping strategies when faced with a stressful life event (e.g., myocardial infarction). Specifically, men tend to be problem-focused copers who seek information, plan, and take direct action whereas women tend to be emotion-focused copers who focus on the positive aspects of situations and seek emotional and social support from other individuals (Frydenberg & Lewis, 1991; Penley, Tomaka, Wiebe, 2002; Vingerhoets & Van Heck, 1990). Indeed, consistent with the socialization hypothesis (Ptacek, Smith, Zanas, 1992), men are conditioned to be relatively "independent, instrumental, rational, and ambitious," and women relatively "emotional, supportive, and dependent" (Boyd-Wilson, Walkey, McClure, Green, 2000). Given that the present study examined men only, and men tend to be problem-focused copers, the men in the present study may have been more concerned with their confidence (i.e., self-efficacy) in their ability to do what is necessary (i.e., exercise) to deal with the problem (i.e., CAD) rather than whether or not they were satisfied with the outcomes of exercise. This might explain the failure of outcome satisfaction to emerge as a significant predictor of adherence to the maintenance cardiac rehabilitation exercise prescription.

Clinical Implications

The findings of the present study have important clinical implications for health care professionals working in the area of cardiac rehabilitation. First, with regard to the focal role that Exercise Beliefs were found to have in relation to both offsite and total exercise adherence, it is up to health care professionals to instill accurate beliefs about exercise to the cardiac patient (Ades et al., 1992). Specifically, in addition to their onsite exercise prescription (e.g., one to two days per week), patients should be prescribed offsite aerobic exercise at least 3 days per week for a duration of 30 minutes to maintain adequate cardiovascular health. In an effort to instill these critical exercise beliefs, health care professionals could monitor patients' adherence and performance progress indirectly by having them complete exercise log books offsite (e.g., at home) in addition to their onsite exercise log books. By making patients accountable for the exercise they do both onsite as well as offsite, they may be more adherent to the total exercise prescription.

Second, given the particular importance of task self-efficacy to offsite exercise adherence and scheduling self-efficacy (one measure of self-regulatory efficacy) to onsite exercise adherence, interventions are needed to enhance both types of efficacy among patients involved in cardiac rehabilitation. With regard to onsite exercise, patients should be provided with instruction and training on how to effectively schedule their prescribed weekly facility-based exercise sessions in order to maximize their adherence. For instance, cardiac rehabilitation program coordinators could provide patients with mock scenarios wherein scheduling their onsite exercise sessions might be a challenge (e.g., an especially hectic week), and then ask them to think of ways in which they might overcome the proposed scheduling conflicts in order to "fit" exercise in (Marlatt & Gordon, 1985). With regard to offsite exercise, again in order to maximize adherence, patients should be provided with instruction and training on how to become more confident in their ability to perform the elemental physical aspects of exercise in an unsupervised setting. For example, while in the supervised onsite setting, cardiac rehabilitation program coordinators could encourage patients to perform as many aspects of the onsite prescription independently such as taking their pulse to ensure that they are training in their target heart rate zone, operating and adjusting the exercise equipment, and warming up and cooling down. This would allow the patient to develop mastery self-efficacy experiences with the task independently, and it is hoped that these independent confidence-enhancing experiences with the task would then transfer to the offsite, unsupervised setting.

Limitations and Future Directions

Considering that this is the first known study to examine both self-efficacy and outcome satisfaction in the prediction of adherence to maintenance cardiac rehabilitation among men with CAD, an important contribution has been made to applied exercise psychology in the area of cardiac rehabilitation. Specifically, this study has identified significant predictors of sustained adherence to the onsite, offsite and total maintenance cardiac rehabilitation prescription which is a first and crucial step towards trying to enhance exercise adherence among individuals with CAD. In addition, this study has provided support for the self-efficacy aspect of Bandura's self-efficacy theory (1986). Even so, some limitations to the present study do warrant mention. First, the participants' exercise adherence was assessed using self-report exercise tracking tables. Consequently, it is unknown whether all participants were completely accurate or honest about their exercise participation over the 4-week study period.

Second, given that the study sample was comprised solely of men, the findings cannot be generalized to the general cardiac population. Specifically, as previously discussed, women and men tend to differ with respect to the way in which they cope with life stressors such as heart disease, such that men tend to use more problem-focused coping strategies whereas women tend to use more emotion-focused coping strategies. In addition, men may be more focused than women on the external control of their disease and may therefore respond to "orders" or externally applied treatment (such as an exercise prescription) better than women (e.g., Buckelew et al., 1990). Thus, replication of this study among women with CAD would be an interesting and worthwhile endeavor for future research.

A third limitation relates to the Satisfaction Questionnaire. Specifically, rather than modifying a general measure of outcome satisfaction according to *perceptions* about the outcomes of exercise that patients with CAD may be most satisfied with, it would have been ideal to develop the specific questionnaire items with more direct help from the patients themselves. Therefore, future studies are needed to refine the outcome satisfaction measure in the CAD population. In addition, it would be of benefit to compare the utility of the outcome satisfaction approach in the prediction of exercise adherence among those individuals in the earlier (e.g., just completed the acute phase of cardiac rehabilitation) versus the later (e.g., years of participation in cardiac rehabilitation) phases of behavioural maintenance. As previously discussed, it may be that Rothman's outcome satisfaction approach is not appropriate in the prediction of exercise adherence among long term maintainers (e.g., such as participants' in the present study) who may in fact be considered "changed" individuals with respect to exercise.

Conclusion

This study has made a significant contribution to the applied exercise psychology literature in the area of exercise-based cardiac rehabilitation. Specifically, in support of the self-efficacy aspect of Bandura's self-efficacy theory (1986) this study has demonstrated that whereas scheduling self-efficacy is a particularly important predictor of adherence to the onsite component of the maintenance cardiac rehabilitation exercise prescription, exercise beliefs and task self-efficacy are especially important predictors of adherence to the offsite component. With regard to the total maintenance cardiac rehabilitation exercise prescription, exercise beliefs, task self-efficacy and scheduling self-efficacy were all found to be significant predictors of adherence. In contrast, the results of this study did not provide support for Rothman's outcome satisfaction approach (2000) in the prediction of sustained adherence to the maintenance cardiac rehabilitation exercise prescription. Thus, from an intervention standpoint, it is up to health care professionals to ensure that cardiac patients' have accurate beliefs regarding the number of days that they need to exercise to maintain cardiovascular health (particularly their beliefs with respect to the offsite exercise prescription). Scheduling and task self-efficacy enhancement interventions are also recommended to maximize the cardiac patients' adherence to both the onsite and offsite components of the maintenance cardiac rehabilitation exercise prescription respectively.

Table 1

Descriptive Statistics for Participant Demographics

Demographic	M (SD)	N	Observed Range
Age (Years)	68.15 (8.03)	101	53-86
BMI	28.02 (4.96)	101	20.65-42.89
Years Post-Cardiovascular Event	9.00 (8.19)	101	1-47
Years in Maintenance Cardiac Rehabilitation Program	5.35 (4.72)	99	0.7-21
		N	%
Ethnicity	White	86	95.6
	Non-White	4	4.4
Education	≤ Highschool	33	32.7
	> Highschool	68	67.3
Smoking Status	Smoker	2	2.0
	Non-smoker	98	98
Cardiovascular Event Type ++	MI	44	43.6
	CABG	51	50.5
	Angina	6	5.9
Days of Exercise Per Week Pre-Cardiovascular Event *	0-1days/week	70	70.0
	2-3 days/week	13	13.0
	4-5 days/week	11	11.0
	Everyday	6	6.0
Days of Exercise Per Week Believed Necessary to Maintain Cardiovascular Health (Exercise Beliefs) *	0-1days/week	2	2.0
	2-3 days/week	43	43.0
	4-5 days/week	38	38.0
	Everyday	17	17.0
Intensity of Exercise Necessary to Maintain Cardiovascular Health	Light	6	5.9
	Moderate	85	84.2
	Strenuous	10	9.9
Fear of Over-exercising	Not at all	67	66.3
	A little	20	19.8
	Moderately	13	12.9
	A lot	1	1.0
	Extremely	0	0.0

Note. * Days of exercise were calculated in accordance with Health Canada's recommendation of at least 30 minutes of exercise per day. ++ MI = Myocardial Infarction, CABG = Coronary Artery Bypass Graft

Surgery.

Table 2

Descriptive Statistics for the Study Variables (N = 101)

Variable	M	SD	Observed Range
Task Self-Efficacy	66.89	8.08	46-80
Self-Regulatory Efficacy			
Scheduling Self-Efficacy	78.91	17.95	20-100
Barriers Self-Efficacy	66.50	18.74	2-100
Outcome Satisfaction	59.89	8.10	30-72
Onsite Exercise Adherence (Days)	6.67	1.88	2-12
% Of Prescribed Onsite Days	83.42	23.46	25-150
Offsite Exercise Adherence (Days)	9.31	6.37	0-22
% Of Prescribed Offsite Days	77.56	53.11	0-183.33
Total Exercise Adherence (Days)	15.98	6.76	3-28
% Of Prescribed Total Days	79.90	33.80	15-140

Note. Task Self-Efficacy scores can range from 16-80; Scheduling and Barriers Self-Efficacy scores can range from 0-100; Outcome Satisfaction scores can range from 12-72. Onsite Exercise Prescription = 2 days of exercise per week as per the onsite program protocol; Offsite Exercise Prescription = at least 3 days of 30 minutes of aerobic exercise per week.

Table 3

Internal Consistency of the Scales

Scale	Alpha Reliability Coefficient
Cardiac Exercise Self-Efficacy Inventory (Task Self-Efficacy)	.84
Scheduling Self-Efficacy Scale	.92*
Barriers Self-Efficacy Scale	.90
Satisfaction Questionnaire	.89

Note. * Prior to removing the item "Put in 2 exercise sessions at MacTurtles each week at equally spaced intervals (e.g., Monday & Wednesday or Tuesday & Thursday)", the internal consistency of the Scheduling Self-Efficacy Scale was .66.

Table 4

Intercorrelations Between Exercise Adherence and Demographic Characteristics

	1	2	3	4	5	6	7	8	9	10	11
1. % Onsite Days	—										
2. % Offsite Days	.07	—									
3. % Total Days	.34**	.96**	—								
4. Age	.12	.08	.10	—							
5. BMI	-.06	-.05	-.06	-.16	—						
6. YPE	.01	-.04	-.03	.11	.09	—					
7. MCR Years	-.07	-.06	-.08	.03	.15	.46**	—				
8. Days Pre +	.08	.22*	.23*	.14	-.13	-.20	-.15	—			
9. Days Maintain +	-.03	.47**	.43**	-.11	.10	-.17	-.11	.19	—		
10. Intensity	.07	.15	.16	-.15	-.04	-.15	-.07	.05	.07	—	
11. Fear	.03	-.12	-.10	.06	.04	-.07	-.23*	-.07	-.21*	-.10	—

Note. ** $p < .01$, * $p < .05$. % Onsite Days = percent of onsite exercise days attended; % Offsite Days = percent of prescribed offsite exercise days attended; % Total Days = percent of total exercise sessions attended; YPE = years post-cardiovascular event; MCR Years = years of participation in the maintenance phase of exercise-based cardiac rehabilitation; Days Pre = days of exercise per week pre-cardiovascular event; Days Maintain = days of exercise per week believed necessary to maintain cardiovascular health; Intensity = intensity of exercise believed necessary to maintain cardiovascular health; Fear = fear of exercising too much. + Days of exercise were calculated in accordance with Health Canada's recommendation of at least 30 minutes of exercise per day.

Table 5

Intercorrelations Between Exercise Adherence, Self-Efficacy and Outcome Satisfaction

	1	2	3	4	5	6	7
1. % Onsite Exercise Days	—						
2. % Offsite Exercise Days	.07	—					
3. % Total Exercise Days	.34**	.96**	—				
4. Task Self-Efficacy	.15	.48**	.49**	—			
5. Scheduling Self-Efficacy +	.41**	.43**	.52**	.57**	—		
6. Barriers Self-Efficacy +	.13	.27**	.29**	.34**	.59**	—	
7. Outcome Satisfaction	.08	.17	.18	.39**	.31**	.15	—

Note. ** p <.01. + Measures of self-regulatory efficacy.

Table 6

Summary of Hierarchical Regression Analysis for Variables Predicting Onsite Exercise Adherence

	R^2	$R^2\Delta$	$F\Delta$	Sig $F\Delta$	B
Step 1					
Task Self-Efficacy	0.02	0.02	2.29	0.13	-0.11
Step 2					
Self-Regulatory Efficacy	0.19	0.17	10.14	0.001	
Scheduling Self-Efficacy					0.57**
Barriers Self-Efficacy					-0.17
Step 3					
Outcome Satisfaction	0.19	0.00	0.10	0.75	-0.03

Note. $R^2 = .19$ ($R^2_{adj} = .16$), $F\,(4, 96) = 5.72, p < .001$

** $p < 0.001$

Table 7

Summary of Hierarchical Regression Analysis for Variables Predicting Offsite Exercise Adherence

	R^2	$R^2\Delta$	$F\Delta$	Sig $F\Delta$	B
Step 1					
Exercise Days Pre-CVE	0.25	0.25	15.88	0.001	0.11
Exercise Beliefs					0.30**
Step 2					
Task Self-Efficacy	0.34	0.09	13.53	0.001	0.24*
Step 3					
Self-Regulatory Efficacy	0.36	0.02	1.73	0.18	
Scheduling Self-Efficacy					0.19
Barriers Self-Efficacy					0.01
Step 4					
Outcome Satisfaction	0.36	0.00	0.01	0.98	-0.00

Note. $R^2 = .36$ ($R^2_{adj} = .33$), $F(6, 92) = 8.85, p < .001$. Exercise Days Pre-CVE = days of exercise for a duration of at least 30 minutes pre-cardiovascular event. Exercise Beliefs = days of exercise for a duration of at least 30 minutes believed necessary to maintain cardiovascular health.

** $p < 0.01$, * $p < .05$

Table 8

Summary of Hierarchical Regression Analysis for Variables Predicting Total Exercise Adherence

	R^2	$R^2\Delta$	$F\Delta$	Sig $F\Delta$	B
Step 1					
Exercise Days Pre-CVE	0.23	0.23	13.99	0.001	0.12
Exercise Beliefs					0.25**
Step 2					
Task Self-Efficacy	0.34	0.11	16.73	0.001	0.21*
Step 3					
Self-Regulatory Efficacy	0.41	0.07	5.29	0.01	
Scheduling Self-Efficacy					0.35**
Barriers Self-Efficacy					-0.05
Step 4					
Outcome Satisfaction	0.41	0.00	0.01	0.91	-0.01

Note. $R^2 = .41$ ($R^2_{adj} = .37$), $F(6, 92) = 10.61, p < .001$. Exercise Days Pre-CVE = days of exercise for a duration of at least 30 minutes pre-cardiovascular event. Exercise Beliefs = days of exercise for a duration of at least 30 minutes believed necessary to maintain cardiovascular health.

** $p < 0.01$, * $p < .05$

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Appendix A

Participant Letter of Information and Recruitment Poster

LETTER OF INFORMATION

Exercise Behaviour Study
You are asked to participate in a research study interested in the exercise behaviour of men coronary artery disease (CAD).

Purpose
The study is designed to examine the exercise behaviour patterns of men with CAD.

Procedure
If you volunteer to participate in this study, the following procedure will take place: The primary investigator will ask you to complete a series of five take-home questionnaires that ask questions about your exercise behaviour. It will take approximately 15 minutes to complete the questionnaires. Participants will also be given four exercise tracking tables to record their exercise bahaviour over a period of 4 weeks. Upon completion of the study, a summary sheet will be placed within the Centre for Health Promotion and Rehabilitation detailing the results of the study.

Potential Risks and Discomforts
There are no risks associated with this study. However, some of the questions on the inventories are personal in nature and may cause some participants to feel uncomfortable responding. Participants may refuse to answer any questions for which they feel uncomfortable.

Potential Benefits to Yourself and Society
You may benefit from participating in this study by becoming more aware of your habitual exercise patterns.

Scientists and health professionals will benefit from this research by gaining knowledge about factors associated with the exercise behaviour of men and women with CAD.

Confidentiality
Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.
The questionnaires are completely private and will be kept in a locked filing cabinet in the researcher's laboratory. Access to this information will only be granted to the researchers listed below. Your identity will never be revealed in any reports regarding this study.

Participation and Withdrawal
Involvement in this study is your choice. If you volunteer to be in this study, you may withdraw at any time and your questionnaires will be destroyed. You may also refuse to

answer any questions on the inventories. If you have any questions or concerns about this study, please feel free to contact us at the numbers listed below.

Rights of Research Participants

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this study. If you have any questions regarding your rights as a research participant, contact:

MREB Secretariat
McMaster University
1280 Main Street W., CNH-111
Hamilton, ON L8S 4L9

Telephone: 905-525-9140, ext. 23142
E-mail: srebsec@mcmaster.ca
Fax: 905-540-8019

After having read and understood the above, if you agree to participate, please complete and return the questionnaires.

Ms. Catherine Lichtenberger
Student Researcher
Department of Kinesiology
McMaster University
Inquiries: (905) 525-9140
Ext. 27624

Dr. Kathleen Martin
Associate Professor
Department of Kinesiology
McMaster University
Inquiries: (905) 525-9140
Ext. 23574

ATTENTION MACTURTLES

Help US Help YOU
PARTICIPATE IN CARDIAC REHABILITATION RESEARCH!!!

We are looking for:

♥ **Men with coronary artery disease**

WHO ARE:

♥ **Participants of the maintenance MacTurtle Cardiac Rehabilitation Program**

You will be asked to:

♥ **Complete 5 take-home questionnaires & 4-weekly exercise tracking tables**

Recruitment Starts on Monday January 27th, 2003

IF INTERESTED CONTACT:
Catherine Lichtenberger
(905) 634-2077

Appendix B

Pilot Study Questionnaire

Satisfaction Questionnaire
Please Mark the <u>ONE</u> box that <u>BEST</u> describes your <u>LEVEL OF SATISFACTION</u>

Since you **joined MacTurtles** how satisfied have you been with the effects of exercise on the following:

1. Your resting blood pressure?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

2. Your resting heart rate?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

3. Your blood cholesterol level?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

4. Your blood lipids (i.e., saturated fat)?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

5. Your body weight?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

6. Your exercise tolerance (i.e., the length of time that you can exercise before experiencing cardiac symptoms such as angina, shortness of breath, dizziness)?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

7. Your physical ability to do what you want or need to do?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

8. Your overall muscle strength?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

9. Your level of endurance/stamina in your daily activities?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

10. Your overall level of energy?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

11. Your overall mood?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

12. Your ability to cope with stress?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

13. Your overall physical appearance?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

14. Your overall health?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

15. How you feel about yourself?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

16. Your flexibility?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

17. The range of motion in your joints?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

Appendix C

Study Measures and Exercise Tracking Tables:

Demographic Questionnaire, Cardiac Exercise Self-Efficacy Instrument (CESEI), Barriers Self-Efficacy Scale, Scheduling Self-Efficacy Scale, Satisfaction Questionnaire, Exercise Tracking Tables 1-4

Demographic Questionnaire

Tell me a little bit about yourself...

Age_____ Weight______ Height______

Ethnic Background_________________

Type of cardiac illness (e.g., heart attack, bypass surgery etc.)___________________

Year of first cardiac diagnosis_______________

Number of years involved with MacTurtles__________________

Highest level of education _________________

Do you smoke? YES NO If YES, how much?___________________

On average, how many **days per week** did you exercise **before** your cardiac illness?_______________________________________

On average, how many **minutes per day** did you exercise **before** your cardiac illness?_______________________________________

In your opinion, how many **days per week** do you need to exercise to **maintain** heart health? **(please circle your answer below)**

0-1 days/week 2-3 days/week 4-5 days/week Everyday

In your opinion, how many **minutes per day** do you need to exercise to **maintain** heart health? **(please circle your answer below)**

0-15 minutes 15-30 minutes 30-45 minutes 60 minutes and greater

In your opinion, how **hard** do you need to exercise to **maintain** heart health? **(please circle your answer below)**

Light intensity Moderate intensity Strenuous intensity

Do you fear exercising too much? **(please place a checkmark below)**

Not at all	A little	Moderately	A lot	Extremely

Cardiac Exercise Self-Efficacy Instrument (CESEI)

Beside each item below, please circle the number that best represents how much confidence you have about performing it.

1	2	3	4	5
Very little Confidence		**Some Confidence**		**Quite a Lot of Confidence**

1. "Warming up" before exercise.	1 2 3 4 5
2. Exercising without getting chest pain.	1 2 3 4 5
3. Knowing when I have exercised too much and need to stop.	1 2 3 4 5
4. Exercising when it is inconvenient.	1 2 3 4 5
5. Knowing what my heart rate should be before and after exercise.	1 2 3 4 5
6. "Cooling down" after exercise.	1 2 3 4 5
7. Fitting exercise into a busy day.	1 2 3 4 5
8. Enduring strenuous exercise.	1 2 3 4 5
9. Knowing what exercise is healthy for me.	1 2 3 4 5
10. Knowing when I can increase my exercise level.	1 2 3 4 5
11. Enduring moderate exercise.	1 2 3 4 5
12. Taking my heart rate before and after exercise.	1 2 3 4 5
13. Resuming my pre-cardiac illness level of activity.	1 2 3 4 5
14. Enduring light exercise.	1 2 3 4 5
15. Exercising for at least 30 minutes most days of the week.	1 2 3 4 5
16. Exercising on days that I am not at MacTurtles.	1 2 3 4 5

Barriers Self-Efficacy Scale

As a MacTurtle participant, and in accordance with the recommendations of Health Canada, you are encouraged to exercise for **at least 30 minutes** on **most days of the week**. This includes 2 weekly exercise sessions at MacTurtles in addition to exercising on your own during most of the remaining days of the week.

The items below reflect common reasons preventing people from participating in exercise sessions or, in some cases, dropping out or quitting exercise altogether. **Using the scale below**, please indicate how **confident** you are that you could exercise in the event that any of the following circumstances were to occur.

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

Over the next 4 weeks, I believe that I could exercise on most days (e.g., MacTurtles twice per week in addition to exercising on my own) if:

	Confidence 0-100%
1. The weather was very bad (rain, snow, cold, ice).	________
2. I was bored by the program or activity.	________
3. I was on vacation.	________
4. I felt pain or discomfort when exercising.	________
5. I had to exercise alone.	________
6. Exercise was not enjoyable or fun.	________
7. It became difficult to get to the exercise location.	________
8. I didn't like the particular activity or program that I was involved in.	________
9. My work (or personal) schedule conflicted with my exercise session.	________
10. I felt self-conscious about my appearance when I exercised.	________
11. The instructor or leader did not offer me any encouragement.	________
12. I was under personal stress of some kind.	________
13. If one of my family members or friends was sick.	________

Scheduling Self-Efficacy Scale

Please state your **CONFIDENCE** in ***your abilities*** to **PERFORM** the **following behaviours regularly** during the next **4 weeks** so that **you exercise most days of the week** (e.g., MacTurtles twice per week in addition to exercising on your own).

Use the scale below to answer.

WRITE the confidence value for each behavior in the space provided.

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

My confidence to do the following regularly **over the next 4 weeks** is:

	Confidence 0-100%
1. Make my exercise sessions high on my priority of weekly activities.	__________
2. Plan and prepare in advance so nothing interferes with my exercise time.	__________
3. Rearrange my schedule so that I can fit my exercise sessions into my daily routine.	__________
4. Make sure I do not miss more than one week of exercise.	__________
5. Take time out for myself to exercise regardless of other commitments.	__________
6. Find a time to exercise that most suitably fits my lifestyle (e.g., early in the morning or later in the evening)	__________
7. Get to my exercise session on time as I have planned.	__________
8. Put in 2 exercise sessions at MacTurtles each week at equally spaced intervals (e.g., Monday & Wednesday or Tuesday & Thursday).	__________

Satisfaction Questionnaire

Please Read Each Question Carefully
Mark the <u>ONE</u> box that <u>BEST</u> describes your <u>LEVEL OF SATISFACTION</u>

1. Over **the past 6 months** how satisfied have you been with the effects of exercise on the length of time that you can exercise before experiencing cardiac symptoms such as angina, shortness of breath, or dizziness?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

2. Over **the past 6 months** how satisfied have you been with the effects of exercise on your body weight?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

3. Over **the past 6 months** how satisfied have you been with the effects of exercise on your physical ability to do what you want or need to do?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

4. Over **the past 6 months** how satisfied have you been with the effects of exercise on your overall muscle strength?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

5. Over **the past 6 months** how satisfied have you been with the effects of exercise on your level of endurance/stamina in your daily activities?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

6. Over **the past 6 months** how satisfied have you been with the effects of exercise on your overall level of energy?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

7. Over **the past 6 months** how satisfied have you been with the effects of exercise on your ability to cope with stress?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

8. Over **the past 6 months** how satisfied have you been with the effects of exercise on your overall physical appearance?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

9. Over **the past 6 months** how satisfied have you been with the effects of exercise on your overall health?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

10. Over **the past 6 months** how satisfied have you been with the effects of exercise on how you feel about yourself?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

11. Over **the past 6 months** how satisfied have you been with the effects of exercise on your flexibility?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

12. Over **the past 6 months** how satisfied have you been with the effects of exercise on the range of motion in your joints?

Very Satisfied	Somewhat Satisfied	A Little Satisfied	A Little Dissatisfied	Somewhat Dissatisfied	Very Dissatisfied

EXERCISE TRACKING TABLE WEEK #1

Instructions:

As a MacTurtle participant, and in accordance with the recommendations of Health Canada, you are encouraged to exercise for **at least 30 minutes** on **most days of the week.** This includes 2 weekly exercise sessions at MacTurtles in addition to exercising on your own during most of the remaining days of the week.

We are interested in learning more about your daily exercise routine as a MacTurtle. To help us do this, please record your exercise sessions with MacTurtles as well as **ALL** exercises that you do on your own time in the **weekly exercise tracking table below.**

** At the end of the week, please return this tracking table to the researcher at MacTurtles in exchange for your second weekly exercise tracking table (e.g., week #2)**

Due date for exercise tracking table week#1:

Date	**Exercise**	**Minutes**
Example 10/21/02	Walking MacTurtles	30 45
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

If you have any questions or concerns regarding this exercise tracking table, please do not hesitate to contact the primary investigator **Miss. Catherine Lichtenberger at (905) 634-2077.**

EXERCISE TRACKING TABLE WEEK #2

Instructions:

As a MacTurtle participant, and in accordance with the recommendations of Health Canada, you are encouraged to exercise for **at least 30 minutes** on **most days of the week**. This includes 2 weekly exercise sessions at MacTurtles in addition to exercising on your own during most of the remaining days of the week.

We are interested in learning more about your daily exercise routine as a MacTurtle. To help us do this, please record your exercise sessions with MacTurtles as well as **ALL** exercises you do on your own time in the **weekly exercise tracking table below.**

** At the end of the week, please return this tracking table to the researcher at MacTurtles in exchange for your third weekly exercise tracking table (e.g., week #3)**

Due date for exercise tracking table #2:

Date	**Exercise**	**Minutes**
Example 10/28/02	MacTurtles	60
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

If you have any questions or concerns regarding this exercise tracking table, please do not hesitate to contact the primary investigator **Miss. Catherine Lichtenberger at (905) 634-2077**.

EXERCISE TRACKING TABLE WEEK #3

Instructions:

As a MacTurtle participant, and in accordance with the recommendations of Health Canada, you are encouraged to exercise for **at least 30 minutes** on **most days of the week**. This includes 2 weekly exercise sessions at MacTurtles in addition to exercising on your own during most of the remaining days of the week.

We are interested in learning more about your daily exercise routine as a MacTurtle. To help us do this, please record your exercise sessions with MacTurtles as well as **ALL** exercises you do on your own time in the **weekly exercise tracking table below.**

** At the end of the week, please return this tracking table to the researcher at MacTurtles in exchange for your fourth weekly exercise tracking table (e.g., week #4)**

Due date for exercise tracking table #3:

Date	**Exercise**	**Minutes**
Example 11/04/02	Cycling	40
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

If you have any questions or concerns regarding this exercise tracking table, please do not hesitate to contact the primary investigator **Miss. Catherine Lichtenberger at (905) 634-2077.**

EXERCISE TRACKING TABLE WEEK #4

Instructions:

As a MacTurtle participant, and in accordance with the recommendations of Health Canada, you are encouraged to exercise for **at least 30 minutes** on **most days of the week.** This includes 2 weekly exercise sessions at MacTurtles in addition to exercising on your own during most of the remaining days of the week.

We are interested in learning more about your daily exercise routine as a MacTurtle. To help us do this, please record your exercise sessions with MacTurtles as well as **ALL** exercises you do on your own time in the **weekly exercise tracking table below.**

** At the end of the week, please return this tracking table to the researcher at MacTurtles.

Due date for exercise tracking table #4:

You have now completed all 4 exercise tracking tables…Thank-you very much!

Date	**Exercise**	**Minutes**
Example 11/11/02	Curling Walked to the grocery store	45 15
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

If you have any questions or concerns regarding this exercise tracking table, please do not hesitate to contact the primary investigator **Miss. Catherine Lichtenberger at (905) 634-2077**.

Appendix D

Results Summary for Study Participants

March 31st, 2003

ATTENTION MACTURTLES:

Here is a **summary of the results** from the study "Self-Efficacy and Outcome Satisfaction As Predictors of Exercise Maintenance in Men with Coronary Artery Disease (CAD)" that you participated in during the month of January 2003.

Primary Investigator: Catherine Lichtenberger (905) 634-2077, if you have any questions regarding the results of this study please do not hesitate to contact me at the number above. I want to thank all of you again for you participation…**this study would not have been possible without you!**

HERE THEY ARE…THE RESULTS:

Measure	**M**	**SD**	**Observed Range**
Age (Years)	68.15	8.03	53-86
BMI	28.02	4.96	20.65-42.89
Years Post-Cardiovascular Event	9.00	8.19	1-47
Years in Maintenance Cardiac Rehabilitation Program	5.35	4.72	0.7-21
Task Self-Efficacy	66.89	8.08	46-80
Self-Regulatory Efficacy			
Scheduling Self-Efficacy	78.91	17.95	20-100
Barriers Self-Efficacy	66.50	18.74	2-100
Outcome Satisfaction	59.89	8.10	30-72
Onsite Exercise Adherence (Days)	6.67	1.88	2-12
% Of Prescribed Onsite Days $^{+}$	83.42	23.46	25-150

Offsite Exercise Adherence (Days)		9.31	6.37	0-22
% Of Prescribed Offsite Days +		77.56	53.11	0-183.33
Total exercise Adherence (Days)		15.98	6.76	3-28
% Of Prescribed Total Days		79.90	33.80	15-140
			N	%
Ethnicity	White		86	95.6
	Non-White		4	4.4
Education	≤ highschool		33	32.7
	> highschool		68	67.3
Smoking Status	Smoker		2	2.0
	Non-smoker		98	98
Cardiovascular Event Type ++	MI		44	43.6
	CABG		51	50.5
	Angina		6	5.9
Days of Exercise Per Week Pre-Cardiovascular Event *	0-1days/week		70	70.0
	2-3 days/week		13	13.0
	4-5 days/week		11	11.0
	everyday		6	6.0
Days of Exercise Per Week Believed Necessary to Maintain Cardiovascular Health (Exercise Beliefs) *	0-1days/week		2	2.0
	2-3 days/week		43	43.0
	4-5 days/week		38	38.0
	everyday		17	17.0
Intensity of Exercise Necessary to Maintain Cardiovascular Health	Light		6	5.9
	Moderate		85	84.2
	Strenuous		10	9.9
Fear of Over-exercising	Not at all		67	66.3
	A little		20	19.8
	Moderately		13	12.9
	A lot		1	1.0
	Extremely		0	0.0

Note. ++ MI = Myocardial Infarction; CABG = Coronary Artery Bypass Graft Surgery. * Days of exercise were calculated in accordance with Health Canada's recommendation of at least 30 minutes of exercise per day.

So What Do These Results Tell Us?

After analyzing the descriptive statistics that are presented above, I wanted to determine what variables were most predictive of long-term adherence (i.e., attendance) to onsite exercise (MacTurtles), to offsite exercise (what you do on you own outside of MacTurtles) and to total exercise (a combination of onsite and offsite exercise). The results of these analyses indicated that scheduling self-efficacy (i.e., how confident you are in your ability to schedule exercise into your daily regime) was most predictive of adherence to onsite exercise (i.e., MacTurtles). Exercise beliefs (i.e., how many days of exercise you believe are necessary to maintain cardiovascular health) and task self-efficacy (i.e., how confident you are in your ability to engage in the elemental physical aspects of exercise) were most predictive of adherence to offsite (i.e., independent) exercise. Finally, exercise beliefs (i.e., how many days of exercise you believe are necessary to maintain cardiovascular health), task self-efficacy (i.e., how confident you are in your ability to engage in the elemental physical aspects of exercise), and scheduling self-efficacy (i.e., how confident you are in your ability to schedule exercise into your daily regime) were most predictive of total exercise adherence (i.e., both onsite and offsite adherence).

How Can These Results Help Us To Help You?

- To help you to adhere better to your onsite exercise sessions (MacTurtles) we could provide you with some information/strategies on how to effectively schedule exercise into your daily life (This could be a potential MacTurtles seminar topic).
- To help you to adhere better to offsite exercise (i.e., what you do on your own) we could provide you with some information/strategies to increase your confidence in your ability to perform the elemental physical aspects of exercise on you own outside of MacTurtles. We could also ensure that your exercise beliefs are in line with the recommendation of at least 3 offsite aerobic exercise bouts per week in addition to your 2 weekly onsite sessions.
- To help you to adhere better to the total cardiac exercise prescription (onsite and offsite exercise) we could help you to increase your confidence in you ability to engage in the elemental physical aspects of exercise, schedule daily exercise, and finally, ensure that the number of days of exercise per week that you believe are necessary to maintain cardiovascular health are in line with Health Canada's recommended guidelines.

Thank-You For Your Participation!