FACTORS PREDICTING PARTICIPANTS' USE OF CARDIAC REHABILITATION PROGRAMS IN ST. JOHN'S NEWFOUNDLAND

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FACTORS PREDICTING PARTICIPANTS' USE OF CARDIAC REHABILITATION PROGRAMS IN ST.JOHN'S NEWFOUNDLAND

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ABSTRACT

The goal of this study was to identify the factors and gender differences that influence and predict the use of the cardiac rehabilitation program in St. John's, Newfoundland. The study attempted to cross-validate research conducted by Johnson, Weinert and Richardson, 1998. The Andersen-Newman framework (Andersen & Newman, 1973) consisting of three determinants of health care utilization (predisposing, enabling and need factors) was used to direct this research. The sample (N 28; 13 females and 15 males) completed a variety of instruments that assessed various factors predicting the use of health services. The instruments were completed at two points, the first being at the outpatient clinic and the second after two months of participation in the cardiac rehabilitation program. Findings indicated that 17 (61%) of the participants attended at least one rehabilitation session. The predisposing variable, internal locus of control, was significant in regards to predicting number of sessions attended at rehabilitation (p .053, SE B = .556). Gender differences were found to be significant for the predisposing factor of social support on the social interaction and tangible subscales (p =.048, d .781 and p .022, d .906, respectively). The need factor of emotional health (vigour subscale) approached significance in regards to gender differences (p .70, d .709). Findings identified that barriers to participation and gender differences do exist in this small sample of cardiac rehabilitation patients which influenced participation and adherence to the local cardiac rehabilitation program. Future research should focus on conducting a study with a larger sample size.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

Overview

The World Health Organization (2005) reported that cardiovascular disease was the cause of death for 14.7 million people in 1990 and that number increased to 17 million people in 1999. Acute myocardial infarction and stroke are among the leading causes of both sickness and death in Canada (Government of Newfoundland and Labrador, 2002). In 1994, cardiovascular disease accounted for 38% of all deaths in Canada (Cardiovascular Disease Surveillance Online, 2002). In 2002, cardiovascular disease accounted for 74,626 Canadian deaths (Heart and Stroke Foundation, 2006). In the province of Newfoundland and Labrador alone, cardiovascular disease accounted for 41% of all deaths in 1999 (Cardiovascular Disease Surveillance Online, 2002).

The total deaths due to cardiovascular disease have been greater in women as compared to men (Heart and Stroke Foundation, 2006). Many women believe that breast cancer is their greatest health threat whereas, in reality, a woman is more than eight times more likely to die from cardiovascular disease than breast cancer (Mosca, et al., 2000). Males are equally at risk for cardiovascular diseases: 32% of all male deaths in Canada in 2002 were due to cardiovascular diseases, compared to 34% of all female deaths (Heart and Stroke Foundation, 2006). Women have been shown to have a similar level of risk reduction as compared to men when lifestyle risk factors (e.g., high blood pressure, physical inactivity and unhealthy eating habits) are modified (Mosca et al., 1997). For individuals who have cardiovascular disease it is important to adopt a healthy lifestyle through secondary prevention such as cardiac rehabilitation.

Cardiac rehabilitation programs have been successful in improving risk factors of cardiovascular disease and reducing morbidity and mortality (Adams et al., 1999; Ades, Waldman, McCann & Weaver, 1992a; Ades, Waldman, Polk & Coflesky, 1992b; Cannistra, Balady, O'Malley, Weiner & Ryan, 1992; Johnston, Foulkes, Johnston, Pollard, Gudmundsdottir, 1999; Lavie & Milani, 1996; Worcester, Hare, Oliver, Reid, & Goble, 1993; Yoshida et al., 1999). Cardiac rehabilitation programs have been proven to reduce the chance of subsequent death from cardiac incidents and all other causes by 20-30%. (Cardiac Care Network of Ontario, 2002). Consequently, programs have been designed and implemented across the country in order to cope with and reduce the impact of heart disease. These programs strive to prevent further progression of the disease while increasing individuals' wellness and quality of life. Cardiac rehabilitation programs are designed to improve both the physiological and psychological health of the patient. Specifically, they are designed to improve functional capacity, alleviate activity-related symptoms, to reduce disability, and to identify and modify coronary risk factors with the aim of reducing subsequent morbidity and mortality resulting from cardiovascular illness (World Health Organization, 2005). Despite the documented evidence of the benefits of cardiac rehabilitation, only one third of patients participate in rehabilitation programs after myocardial infarctions (Daly et al, 2002).

Adherence to Cardiac Rehabilitation

Many people find it easier to start an exercise or health program than to continue the program, with up to 60% of participants dropping out of programs within the first six months (Bock et al., 1997; Gordon, 1993; Oldridge, 1991; Oldridge & Streiner, 1990;

Radtke, 1989; Shephard, Berridge, Montelpare, Daniel & Flowers, 1987; Weinberg, 2004). The same pattern occurs within medically supervised group exercise programs with the largest proportion of dropout occurring within six months followed by a slower rate thereafter (Oldridge, 1991).

Research conducted over three decades reveals consistent factors associated with non-adherence to cardiac rehabilitation or exercise programs: being older, being female, having fewer years of formal education, having angina, and being less physically active during leisure time (Ades et al., 1992b; Blanchard, Rodgers, Courneya, Daub & Knapik, 2002; Conn, Taylor & Wiman, 1991; Daly et al., 2002; Dishman et al., 1985; Fleury et al., 2004; Hovell et al., 1992; Ice R, 1985; Oldridge, 1984; 1991; 1995; Yates, Skaggs & Parker, 1994). Research has also shown that patients' beliefs about their treatment can strongly influence their adherence (Cooper, Weinman, Hankins, Jackson & Horne, 2006; Horne & Weinman, 2002; Hovell et al., 1992; Ross, Walker & MacLeod, 2004; Sallis & Hovell, 1990). Perceived barriers to health behaviour change is one such concept believed to influence adherence to risk reduction programs (Fleury, Lee, Matteson & Belyea, 2004). Early identification of potential barriers that limit or prevent participation and adherence would enable interventions to target specific variables affecting participants' use of cardiac rehabilitation programs. Participation in these programs can increase and be maintained over time through the identification of perceived barriers to health behaviour change.

Barriers to Participation

A variety of barriers deter participants from participating in exercise or rehabilitation programs. Age, gender, lack of support, financial issues and provider-oriented barriers (e.g., lack of referral) are common factors that lead to lack of participation in cardiac rehabilitation programs (Ades, Waldmann, McCann & Weaver, 1992a; Ades, Waldmann, Polk, Coflesky, 1992b; Biggs & Fleury, 1994; Cottin et al., 2004; Evenson & Fleury, 2000; Fleury et al., 2004; Mosca, McGillen & Rubenfire, 1998; Witt et al., 2004; Whitmarsh, Koutantji, & Sidell, 2003; Wyer et al., 2001). Socioeconomic variables, including level of education and employment status, have also been linked to physical activity attendance and performance (Ades et al., 1992a; Clark, 1995; Cooper, Lloyd, Weinman & Jackson, 1999; Daly et al., 2002; Dishman, Sallis & Omstein, 1985; Fleury et al., 2004; Johnson, Weinert & Richardson, 1998; Ramm, Robinson & Sharpe, 2001). Additionally, barriers may be unique across age groups, the nature of the barrier may change as people age and barriers may differ between men and women. Reasons for women having poorer attendance at cardiac rehabilitation include having poor support systems and psychosocial factors including anxiety and depression (Oldridge, Ragowski & Gottlieb, 1992; McGee & Horgan, 1992; Hawkes & Holms, 1993). Reported barriers to participation may lead to a lack of motivation to attend or adhere to rehabilitation programs.

Statement of Purpose

The primary purpose of this exploratory study was to examine the barriers to participation and adherence of patients enrolled in the cardiac rehabilitation program

offered by the Healthcare Corporation of St. John's, Newfoundland. The objectives of the study were to 1) cross-validate a research study conducted by Johnson, Weinert and Richardson (1998) within the province of Newfoundland, Canada 2) to determine potential gender differences in the reporting of barriers to participation in the cardiac rehabilitation program, and 3) to determine factors which predict cardiac rehabilitation adherence.

This study attempted to cross-validate research conducted by Johnson, Weinert and Richardson (1998) which used the Andersen and Newman (1978) framework to examine the predisposing, enabling and need factors that contributed to or impeded the success of participation in the cardiac rehabilitation program. The Andersen and Newman theoretical framework consists of three factors: predisposing, enabling and need. Predisposing factors exist prior to illness and describe the tendency of the patient to make use of the available services, including demographics, locus of control and intent to use services. Enabling factors are the barriers and facilitator issues to the use of health services such as ease of accessibility and environmental factors (e.g., weather and travel conditions). Need factors are the patients' objective and subjective contemplation of the decision to use health services including physical and psychological health, perceived seriousness of illness and functional abilities. The Johnson, Weinert and Richardson (1998) study collected data from participants at three points, using instruments to assess factors influencing the use of health services. All participants were adults living in rural areas who had experienced a cardiac event and received treatment at one of four hospitals in two western states. Findings indicated that 28% of participants attended rehabilitation and only 17% completed the full 36 week program. Four predisposing factors, one

enabling factor and two need factors were significant in explaining the number of sessions attended. Other studies using this framework have found that participants with predisposing factors such as being older, married, more educated, and having increased levels of social support and the need factor of having firm beliefs that the services were essential to good health, used more preventive services in health care utilization (Hubbard, Muhlenkamp & Brown, 1984; Strain, 1991; Wan, 1982).

Research Questions

This research study focused on understanding factors predicting participants' utilization and adherence to a cardiac rehabilitation program. The study sought to investigate the following questions:

1. What are the predisposing, enabling and need factors that cardiac rehabilitation program participants face?
2. Do gender differenees exist between the predisposing, enabling and need factors of cardiac rehabilitation program participants?

Definition of Key Terms

Adherence

The extent to which a person continues with their exercise program (Dishman, 1997).

Cardiac Incident

For the purpose of this study, a cardiac incident includes any type of cardiovascular disease in which the patient was sent to the cardiologist and then referred

to the cardiac rehabilitation program. Examples of a cardiac incident include heart attack, heart surgery and hypertension.

Cardiac Rehabilitation Program

Program designed to prevent further progression of cardiovascular disease while increasing wellness and quality of life in participants (Canadian Cardiac Rehabilitation Foundation, 2003).

Cardiovascular Disease

A disease of the heart or blood vessels. There are many types of cardiovascular disease that require surgery and/or rehabilitation. Various types include coronary or ischemic heart disease, cerebrovascular disease (stroke), hypertension (high blood pressure), heart failure, rheumatic heart disease and heart attacks (World Health Organization, 2003).

Enabling Factors

Barriers and facilitators to the use of health, including economic and environmental factors (Johnson, Weinert & Richardson, 1998).

Gender

Gender is a social-theoretical construct used to differentiate the male and female sex; it comprises masculinity and femininity (Hall, 1988; Shaw, 1995).

Healthcare Corporation of St. John's Cardiac Rehabilitation Program

The program offered by the Healthcare Corporation of St. John's, Newfoundland is a six month long program. Participants exercise for an hour and a half, three times a week for the first three months and then an hour and a half two times a week for the last three months. Participants can join in the existing program upon being referred by the cardiologist and completing a mandatory stress test.

Need Factors

Objective and subjective aspects of the patient's decision to utilize health care services (Johnson, Weinert & Richardson, 1998).

Predisposing Factors

Factors that exist prior to the onset of illness and describe the inclination of individuals to use health services (Aday, Andersen & Fleming, 1980).

Self Efficacy

A person's belief in their capability to perform a behaviour successfully (Bandura, 1997).

Delimitations

Participation in the present study was restricted to patients diagnosed with a cardiac incident within the last year and referred by a medical doctor to the cardiac rehabilitation program conducted by the Healthcare Corporation of St. John's. Participation was also restricted by the referral process of the Healthcare Corporation who only accepted patients living within 45 kilometers of the city center. The resulting sample used for this study was primarily local St. John's residents or subjects who lived within a 45 kilometer radius who would not perceive rurality as being a barrier for participation in a cardiac rehabilitation program.

Significance of the Study

The present study contributed to the knowledge about potential barriers people encounter in participating and adhering to the cardiac rehabilitation program in St.

John's, Newfoundland. Cardiovascular disease remains the leading cause of death in Canada, with the highest rates in Newfoundland and Labrador (323.53 deaths/100,000) (Cardiovascular Disease Surveillance Online, 2002). Also, there is a rising incidence of cardiovascular disease in women, comprising more than 52% of annual deaths in the United States in 2000 (American Heart Association, 2005) as well as 34% of all deaths in Canada in 2002 (Heart and Stroke Foundation, 2006). With the rising numbers of heart incidents occurring in Newfoundland, residents may benefit from participating and adhering to cardiac rehabilitation programs.

This study also sought to cross-validate Johnson, Weinert and Richardson's 1998 study within Newfoundland. Cross-validation studies are important in order to explore whether theoretical frameworks hold true within a variety of contexts and populations. This study also solely focused on examining the only cardiac rehabilitation program located within St. John's, Newfoundland. No similar studies have previously been conducted in Newfoundland, much less focusing research on the St. John's cardiac rehabilitation program.

Finally this study is significant in that it explores gender differences in barriers to cardiac rehabilitation. Previous research has found that women have a much lower participation rate in cardiac rehabilitation compared to men (Ades, Waldman, Polk & Coflesky, 1992b; Barber, Stommel, Kroll, Holmes-Rovner, & McIntosh, 2001). Learning more about perceived barriers to utilization and adherence to local programs can lead to interventions that address the needs of patients to the fullest extent. With the identification of specific factors, adjustments to future programs can be made in order to

minimize barriers and increase the much desired participation in cardiac rehabilitation programs.

Summary

This chapter provided a synopsis on the research and background information on cardiovascular disease and cardiac rehabilitation programs. The barriers and problems that predict adherence to cardiac rehabilitation programs were also identified. Presented within the chapter were the purpose for conducting this study, the research questions, the definitions of terms, delimitations and the significance of the study. Chapter two will provide an extensive review of the research studies conducted on cardiovascular disease, cardiac rehabilitation programs and barriers to participation and adherence in such programs.

CHAPTER 2: REVIEW OF LITERATURE

Overview

The previous chapter introduced the topic and overviewed the research on cardiovascular disease and factors that predict people's participation and adherence to cardiac rehabilitation. The following chapter is a literature review that describes and outlines the research previously completed on cardiovascular disease, cardiac rehabilitation programs, barriers to participation and adherence to the programs. The chapter is divided into several sections that review the topics of cardiovascular disease, cardiac rehabilitation programs, the benefits and barriers to participation, the conceptual framework of the study and adherence to the cardiac rehabilitation programs. A summary concludes this chapter.

Cardiovascular Disease

Cardiovascular disease refers to the classes of diseases that involve the heart, the blood vessels and the system of blood vessels throughout the body and within the brain (Heart and Stroke Foundation, 2007). Although there are many factors associated with developing cardiovascular disease, the primary problem is that the supply of oxygen and the necessary nutrients carried by the blood are constricted or blocked. Common types of cardiovascular disease are rheumatic heart disease, hypertensive heart disease, ischemic heart disease, cerebrovascular heart disease and inflammatory heart disease. Coronary artery disease, a type of ischemic heart disease, is caused by atherosclerosis (narrowing or blockage of the arteries) and is one of the most common forms of heart disease (World Heart Federation, 2007).

Cardiovascular disease was the single greatest cause of death in Canada in 2001, accounting for one in three deaths (Health Canada, 2005). In 2002, 32% of all male deaths and 34% of all female deaths in Canada were due to cardiovascular disease (Heart and Stroke Foundation, 2006). In the United States, cardiovascular disease accounted for 36.3% of all deaths, or 1 of every 2.8 deaths in 2004 (The American Heart Association Statistics Committee, 2007). It is estimated that 60,000 patients are admitted to the hospital with acute myocardial infarction in Canada each year (Cardiac Care network of Ontario, 2002). High blood pressure, high blood cholesterol, being overweight, being obese and having type 2 diabetes are among the major biological risk factors for cardiovascular disease (World Heath Organization, 2005). Many cardiovascular diseases are preventable by modifying primary risk factors: unhealthy diet, physical inactivity and smoking.

The most cost-effective method of reducing cardiovascular risk among a population is an intervention that combines health promotion with physical activity. Cardiac rehabilitation programs have been proven to improve a variety of outcomes from exercise tolerance to coronary artery disease risk factors (Jobin, 2005). Studies have shown a reduction of coronary heart disease risk following a supervised program of moderate intensity exercise in both men and women (Hellenius, de Faire, Berglund, Hamsten & Krakau, 1993; Jolliffe et al., 2003; Sartorio et al., 2001; Tully, Cupples, Chan, McGlade & Young, 2005). A review of 37 cardiac rehabilitation program studies (Michie, O'Connor, Bath, Giles & Earll, 2005), revealed that the programs produced a 34% reduction in cardiac mortality., 29% reduction in recurrence of myocardial infarction and had positive effects on blood pressure, cholesterol, body weight, smoking behaviour,

exercise and eating habits in patients. Although many benefits of exercise in cardiac rehabilitation have been noted, programs have evolved throughout the years to encompass more than just exercise.

Modern Cardiac Rehabilitation Programs

Initially, cardiac rehabilitation programs included limited exercise and bed rest with minimal attention paid to changing the individual's lifestyle and psychological health. Today, rehabilitation involves a comprehensive service of an exercise program, psychological interventions and lifestyle modifications in order to achieve and maintain optimal physical and psychosocial health of patients throughout the world (American College of Sports Medicine, 1995; American Heart Association, 2005; Cardiac Care Network of Ontario, 2002; Coats, McGee, Stokes, & Thompson, 1995; De Backer et al., 2004; Worth Health Organization Expert Committee, 1993). A major component of rehabilitative programs consists of physical activity. Physical activity is performed on a repeated basis with specific objectives to improve fitness, physical performance and health (Fleury et al., 2004).

Cardiac rehabilitation programs in North America are comprised of many core components as recognized by The American Heart Association, the American Association of Cardiovascular and Pulmonary Rehabilitation and the Canadian Association of Cardiac Rehabilitation. These core components include baseline patient assessment; nutritional counseling; risk factor management; psychosocial management; physical activity counseling; and exercise training (Balady et al., 2000). Recommendations and information are listed for the evaluation, intervention and

expected outcomes of each core component. A cardiac rehabilitation team typically offers exercise training, education, and counsels both client and family members about risk factors, lifestyle changes, and coping with the disease process (Daly et al., 2002). The Cardiac Care Network of Ontario (2002) describes cardiac rehabilitation programs as having to be multifaceted, multidisciplinary and individualized in order for optimal cardiovascular health to be achieved. Cardiac rehabilitation programs are multifaceted. They use different strategies to cope with heart disease that often include education, counseling, healthy diets, medication, exercise and behaviour modification. The programs are multidisciplinary by employing the services of many different people such as nurses, doctors, dieticians, counselors and exercise therapists. The programs are also individualized to provide assessment and services based on the individual's goals and needs. In order to encompass all the components of cardiac rehabilitation, the programs occur through phases.

The modern cardiac rehabilitation model consists of four phases in North America (American Association of Cardiovascular and Pulmonary Rehabilitation, 1991; American College of Sports Medicine, 1995; Swabey, 1997). The first phase takes place in the hospital immediately post heart incident and consists of regaining functions of daily activities and walking, as well as health education. The second phase occurs up to eight weeks after discharge from the hospital and is an easy, light rehabilitation program designed to help the patient return to normal activities of daily living. Phase three of the program usually occurs four to six weeks post event and is a formal training or exercise phase where aerobic and resistance training is prescribed and monitored in an exercise setting. Phase four is a long term phase dedicated to maintenance and continuation of

education to modify risk factors and to reduce risk of future heart events. Most cardiac rehabilitation programs outside of the hospital consist mainly of phase III (Swabey, 1997), although each patient is introduced to the following components of cardiac rehabilitation during their recovery process.

Components of Cardiac Rehabilitation

Introduction

Cardiac rehabilitation programs have gradually incorporated more features than just exercise. These added features and benefits, as well as exercise, fall into three main components of cardiac rehabilitation programs: education, exercise and counseling.

Education

Education is an essential part of any cardiac rehabilitation program. Written information in the form of pamphlets and education booklets are widely distributed to patients at time of surgery and are supplemental to information given by the medical staff. As well, informational meetings are held between the cardiologist and the patient at the time of referral to the cardiac rehabilitation programs, promoting the benefits of becoming physically active, the benefits of healthy eating and the benefits of smoking cessation. Ideally, education should start at the onset of the disease and continue throughout the rehabilitation process (Heart and Stroke Foundation of Canada, 2005).

Exercise

Exercise has been deemed a safe and essential component to a cardiac rehabilitation program. Aerobic training comprises most of the exercise component of cardiac rehabilitation and may begin upon referral from a medical doctor. Most cardiac

rehabilitation programs require that participants take an entry exercise stress test, with a doctor present, prior to beginning the program. The level of exercise intensity to be endured by the patient is then determined using the stress test results.

Resistance training is also frequently used in cardiac rehabilitation. If properly structured and conducted safely, resistance training can be beneficial for cardiac patients (Merrill, 1997). Resistance training can improve strength, bone mass and neuromuscular control. Several studies suggest that properly screened cardiac patients may begin resistance training programs as inpatients, with light activities such as squeeze balls and easy calisthenics in bed or in a chair. In Phase II, patients can continue resistance training with light dumbbells and elastic bands. Resistance training programs have been successfully initiated as early as three to eight weeks after the heart event has occurred (Butler, Palmer & Rogers, 1992; Squires et al., 1991; Stralow, Ball & Looney, 1993).

Counseling

Many factors are regarded as stress-inducing for both the family and the patient after a heart incident occurs. Some examples of stress inducing events include the major surgery, temporary loss of income during recuperation time and uncertainty of the future. Most patients that suffer a heart event need to critically re-examine their lifestyle and make changes that promote a healthier, more active way of life. Counseling provides an outlet for emotional support and an opportunity for free advice. Thompson and Bowman (1998) advocated strongly for the benefits of counseling services, as sessions will initially help the person regain their sense of control. Counselors conduct sessions informing patients of healthy lifestyle practices and teach ways of modifying risk factors such as weight loss, cessation of smoking and stress management. Family members are also

included in these sessions in order to provide support and minimize setbacks the patient can face while trying to adhere to the new changes in their lives.

Benefits to Cardiac Rehabilitation

Cardiac rehabilitation programs are designed to restore patients to full function and improve their prognosis after surgery, as well as improving their emotional functioning and prognosis through secondary measures (Cardiac Care Network of Ontario, 2002). These programs have many beneficial aspects in both physical and psychological functioning.

Cardiac rehabilitation programs have been shown to reduce the risk of future heart events by 25% in patients during their first year of recovery (Heart and Stroke Foundation of Canada, 2005). Other studies have shown benefits in terms of mortality, morbidity and quality of life from a psychosocial and education-based perspective (Adams et al., 1999; Ades et al., 1992a; Ades et al., 1992b; Cannistra et al., 1992; Cheng & Boey, 2004; Daly et al., 2002; Dusseldorp, Van Elderen, Maes, Meulman, & Kraaij, 1999; Johnston, Foulkes, Johnston, Pollard, & Gudmundsdottir, 1999; Linden, Stossel & Maurice, 1996; Worcester, Hare, Oliver, Reid & Goble, 1993). Participants who complete cardiac rehabilitation programs have improved exercise capacity and habits, improvement in blood lipid and lipoprotein levels, body weight, blood pressure levels, cessation of smoking and have psychological benefits that include anxiety reduction and depression as compared to before starting the program (Ades, 2001; Ades & Coello, 2000; Balady et al., 1994; Balady, Jette, Scheer & Downing,1996; Burns, Camaione,

Froman & Clark, 1998; Franklin, Gordon & Timmis, 1992; Gibbons & Clark, 2001; Lavie & Milani, 1995; 1996; Lavie, Milani & Littman, 1993).

Giese and Schomer (1986) found that participation in a formal cardiac rehabilitation program enhanced participants' emotional stability while decreasing the incidence of depression and anxiety that is common in cardiac patients. As well as decreasing depression and anxiety, Michie et al. (2005) found patients attending a cardiac rehabilitation program had more confidence in their ability to change their eating habits and had increased perceived control over their illness at both two and eight months after the end of the program compared to before starting the program. Participating in physical activity has shown increases in self-efficacy as people move from a sedentary lifestyle to long-term maintenance of regular exercise (Marcus, Eaton, Rossi & Harlow, 1994; Sallis, Hovell & Hofstetter, 1992).

Age has been documented as a cardiac rehabilitation barrier with increased age being associated with reduced rehabilitation effects. However, there have been some benefits of cardiac rehabilitation programs documented in populations over the age of 70 years (Balady et al, 1996; Dolansky, Moore, Faan & Visovsky, 2004; Lavie & Milani, 1995; 1996; Lavie et al., 1993). Cardiac rehabilitation programs are beneficial to optimize risk reduction, reduce disability and promote an active lifestyle in older adults. Studies have shown that participation in exercise programs improves older adults' exercise capacity, quality of life, mood and energy level and exercise habits as well as reducing frailty and risk for cardiovascular disease (Ades & Grunvald, 1990; Ades, Waldmann & Gillespie, 1995; Binder et al., 2002; Chang et al., 2004; Cottin et al., 2004; Dolansky & Moore, 2004; Fiatarone Singh, 2002; Jankowski & Sullivan, 1990; Keller,

Fleury & Mujezinovic-Womack, 2003; Lavie & Milani, 1995; Marchionni et al., 1994; Packa et al., 1989; Stahle, Mattsson, Ryden, Unden & Norlander, 1999; Witt et al, 2004). Additionally, the elderly population has shown improvements in their physical work capacity, psychosocial profiles (e.g., anxiety and depression scores) and secondary prevention methods (e.g., smoking cessation, lower blood pressure, medication and healthy lifestyle). Older adults' rates of improvement in functional capacity with exercise after a cardiac event are similar to those of younger individuals (Marchionni, 2003; Pasquali, Alexander & Peterson, 2001). Even patients over the age of 75 years have shown benefits similar to those observed in the younger elderly population (Cononie et al., 1991). Older adults adapt to exercise in a manner that is similar to younger individuals. Even older adults can improve their strength, decrease the risk for falls, improve cardiorespiratory fitness and improve their ability to live independently (American College of Sports Medicine, 1998; Grimby, 1986). Yet despite the documented benefits of cardiac rehabilitation programs, only 15%-30% of patients who have had a cardiac incident participate in such programs (Ades et al., 1992a; Burns et al., 1998; Bunker, McBurney, Cox, & Jelinek, 1999; DeBusk, 1992). The low percentage of participation in cardiac rehabilitation programs by patients who have suffered a cardiac incident may be the result of many different barriers that deter people from participation.

Barriers to Participation

Barriers to participation have been studied extensively with findings indicating that lack of time and lack of desire or interest are common barriers to participation (Dishman, 1982; Forkan et al., 2006; Gori, Pivotti, Mase, Zucconi, & Scardi, 1984; King

et al., 2002; Martin & Dubbert, 1986; Oldridge, 1982; Slenker, Price, Roberts & Jurs, 1984). Early studies also revealed a relationship between lack of spouse or family support and participation in exercise (Andrew et al., 1981; Andrew & Parker, 1979; Bruce, Frederick, Bruce & Fisher, 1979; Morgan, 1979). Other studies have found that lack of referral by physicians, associated illness, specific cardiac diagnoses, self-efficacy and self-esteem, distance and transportation, self-concept, self-motivation, family composition, and occupation influence participation in exercise or cardiac rehabilitation programs (Ades et al., 1995; Ades et al., 1992a; Cannistra, Balady, O'Malley, Weiner & Ryan, 1992; Conn et al., 1991; Daly et al., 2002; Hiatt, Hoenshell-Nelson & Zimmerman, 1990; Lieberman, Meana & Stewart, 1998; Melillo et al., 1996; Yates, Skaggs, & Parker, 1994). In Evenson's and Fleury's (2000) recent study, program directors identified the most common barrier to participation in outpatient cardiac rehabilitation was financial reasons. Other barriers identified included lack of patient motivation, patient work or time conflicts and lack of physician support or referral.

Various theoretical and conceptual models have been used to explore barriers to cardiac rehabilitation including the Transtheoretical Model (Bock et al., 1997; Hellman, 1997; Jue & Cunningham, 1998; Prochaska & DiClemente, 1983) and the Social Cognitive Theory (Bandura, 1977; Bock et al., 1997; Ewart, Taylor, Reese & DeBusk, 1983; Jeng & Braun, 1997). As well, the Theory of Planned Behaviour (Ajzen, 1985; Ajzen & Madden, 1986; Johnston et al., 1999; Jolly et al., 1999; Terry & O'Leary, 1995), Leventhal's self-regulatory model (Leventhal et al., 1980; Michie et al., 2005; Petrie et al., 2002; Weinman, Petrie, Sharpe & Walker, 2000) and the Andersen-Newman

framework (Andersen & Newman, 1978; Johnson, Weinert & Richardson, 1998) have all been used in cardiac rehabilitation research.

Conceptual Framework

Numerous factors contribute to the decision to utilize health care services or participate in a formal cardiac rehabilitation program. This study used a framework for examining health care utilization (Andersen & Newman, 1973) which consists of three major factors: predisposing, enabling and need. Predisposing factors include demographic and socio-structural characteristics, health beliefs, locus of control and intent to participate. Enabling factors include barriers to the use of health services, economic and environmental factors. Need factors include subjective physical and psychological health status, perceived severity and consequences of illness as well as functional abilities.

The Andersen-Newman framework has been widely used by researchers investigating health services utilization (Johnson, et al., 1998; Hansell, Sherman & Mechanic, 1991; Hubbard et al., 1984; Strain, 1991; Wan, 1982). Wan (1982) found that participants with predisposing factors such as being older, married, and more education along with enabling factors such as having a higher income and adequate health insurance used more health services and participated in more health maintenance activities. Strain (1991) found that participants with a need factor of having a strong belief that services were essential to well-being used more health services, whereas none of the enabling factors were significant. Johnson et al. (1998) found that the predisposing variable of intent to attend a program was the strongest predictor of cardiac rehabilitation

utilization. As well, predisposing variables of age and social support along with the enabling variable of rurality were found to be significant in explaining the variance in cardiac rehabilitation program use.

This study attempted to cross-validate the study conducted by Johnson et al. (1998). No previous studies have been conducted in Canada using the Andersen-Newman (1973) framework. As well, there is no research that is readily available on the use of formal cardiac rehabilitation programs by residents of St.John's, Newfoundland. This study will use the framework to examine the predisposing, enabling and need factors that contributed to or impeded the success of participation in the local cardiac rehabilitation program.

The following material will discuss specific predisposing barriers (demographics, age, gender, socioeconomic status, social support, self-efficacy, depression and anxiety), enabling barriers (provider oriented and rurality), as well as factors influencing adherence to cardiac rehabilitation programs. An overview of cardiovascular disease in the province of Newfoundland will also be presented.

Predisposing Barriers

Age, gender and race have been reported to be significant barriers to participation in cardiac rehabilitation. Women, seniors, and racial minorities have the lowest participation rates in the cardiac rehabilitation population (Beckie, 2006; Stone & Arthur, 2004; Witt et al., 2004). Perceived barriers may be unique across age groups and may change as people age (Fleury et al., 2004). Additionally, socio-demographic factors appear to predict attendance with non-attendees being more likely to be socially deprived, older and living alone (Schulz & McBurney, 2000; Pell & Morrison, 1998).

Age. Adults older than 65 comprise more than half of all patients admitted for myocardial infarction, coronary artery bypass surgery or intracoronary intervention (American Heart Association, 2003; Statistics Canada, 1997). Despite the higher incidence of cardiovascular disease among older adults, participation in cardiac rehabilitation programs has been found to decrease with age (Bittner & Oberman, 1993; Blackburn et al, 2000; Evenson, Rosamond & Luepker, 1998). French, Lewin, Watson and Thompson (2005) found age significantly predicted cardiac rehabilitation attendance with younger individuals more likely to attend. According to a United States national survey (United States Department of Health and Human Services, 1996) older people tend to avoid physical activity, particularly at older ages with less than 25% of older adults exercising regularly at a level high enough to gain physical and health benefits.

Older adults who have suffered a cardiac event experience increased morbidity and mortality, increased occurrence of congestive heart failure, decreased exercise capacity, higher rates of disability and higher rates of depression than that of the younger individual (Ades, 1999). Also, older adults who have established lifelong habits and for whom the predominant belief is that it is too late for exercise to have a positive effect on health, find changing their behaviour patterns especially difficult (Burbank, Reibe, Padula, & Nigg, 2002). The commonly held belief of older people is that unless they have been active all their lives, beginning to exercise in old age is not beneficial (Burbank et al., 2002). Stuart-Shor, Buselli and Carroll (2003) reported that the data specific to determining a relationship between cardiovascular disease and psychosocial factors in older persons is limited and the physical limitations that accompany aging

predispose older adults to a decreased quality of life, increased risk of depression and more difficulty engaging in lifestyle modification.

Gender. Coronary heart disease remains the leading cause of death and disability in North American women, claiming the lives of more than half a million women each year: about 1 death per minute (American Heart Association, 2004). In Canada, statistics from 2002 reveal that 32% of all male deaths were due to cardiovascular disease compared to 34% of all female deaths (Heart and Stroke Foundation, 2006). As well, more than 2.8 million women in North America have a history of myocardial infarction and more than 400,000 have angioplasty or coronary artery bypass graft surgery each year (Moore, Dolansky, Ruland, Pashkow & Blackburn, 2003). In comparison to men, women are usually older when they develop cardiovascular disease and have a higher incidence of angina. The percentage of all deaths due to cardiovascular diseases increases after the age of 50 years for women and after the age of 40 years for men (Heart and Stroke Foundation, 2003). The literature reports an increased incidence of cardiovascular heart disease in women as they enter menopause and into the postmenopausal period (Sloane et al., 1981). As well, cardiovascular disease accounts for 43% of the annual mortality in American women (Hughes & Hayman, 2004).

Women often face overwhelming psychosocial and physical rehabilitative hurdles and the attendance of referred women in cardiac rehabilitation is often sporadic because of family responsibilities or economic barriers (Evenson et al., 1998; Halm, Penque, Doll, & Beahrs, 1999; Heid & Schmelzer, 2004; O'Farrell, Murray, Hueston, LeGrand & Adamo, 2000). Mosca et al. (1998) concluded that self-esteem, stress and time were rated as important barriers significantly more by women than by men. As well, higher

rates of depression have been found as a barrier to cardiac rehabilitation by women (Arthur, 2005; Beckie, 2006; Fleury, Kimbrell, & Kruszewski, 1995; Keresztes, Merritt, Holm, Penckofer & Patel, 2003; LaCharity, 1999; Todaro, Shen, Niaura & Tikemeier, 2005)

Heid and Schmelzer (2004) performed a review of 202 hospital charts and found that men and women were equally likely to be referred for cardiac rehabilitation but women were significantly less likely to enroll. Women in the study reported barriers to enrollment as concern for family members, transportation problems, physical limitations and expense. Studies have consistently shown that women participating in cardiac rehabilitation programs have significantly higher dropout rates and lower adherence rates to the programs compared with men (Blanchard et al., 2002; O'Callaghan et al., 1984; Oldridge, Ragowski, & Gottlieb, 1992; Schuster, & Waldron, 1991). Research has found women eligible for cardiac rehabilitation often live alone, receive little social support, endure multiple role strain, have financial concerns and have limited healthcare access (Allen, Scott, Stewart & Young, 2004; Cottin et al., 2004)

Socioeconomic Status. Socioeconomic status, unemployment and education all play a factor in barriers to healthcare (Ramm et al., 2001). These barriers are highly interrelated as lack of education may lead to unemployment and a lower socioeconomic status or vice versa. As well, in the United States, lack of medical insurance is a major barrier for use of cardiac rehabilitation programs which may be linked to unemployment or socioeconomic status.

Studies have found that socioeconomic factors are barriers to cardiac rehabilitation programs. For example, Fleury, et al. (2001) found significant differences

in acceptance of a sedentary lifestyle as a perceived barrier to exercise adherence by those less educated. Also, employment status showed significant differences for work as a barrier among those who were employed full time.

Studies conducted decades ago found that patients with lower incomes and education levels as well as those with lower socioeconomic status are less likely to attend and adhere to cardiac rehabilitation programs (Daltroy, 1985; Dishman et al., 1985). Studies within the last decade found lower participation and adherence rates for blue-collar workers, non-employed persons and participants with a lower income or educational level (Ades et al., 1992a; Alter, Iron, Austin & Naylor, 2004; Cooper, Lloyd, Weinman & Jackson, 1999; French et al., 2005; Harlan, Sandler, Lee, Lam & Mark, 1995; Johnson et al., 1998; Lane, Carroll, Ring, Beevers & Lip, 2001; Pell, Pell, Morrison, Blatchford & Dargie, 1996; Ramm et al., 2001).

Social Support. Social support refers to the functions or provisions given by one's social relationships such as emotional concern, assistance or information. Lack of social support is associated with increased cardiovascular risk (Mookadam & Arthur, 2004; Smith & Ruiz, 2002). Social support has also been identified as an influential aspect in determining attendance and adherence to cardiac rehabilitation programs (Jones, Farell, Jamieson, & Dorsch, 2003; Litt, Kleppinger & Judge, 2002; Lee, 1993; Salis et al., 1992; Yates et al., 1994). Therefore, increased attention has been placed on the spouse's role in facilitating cardiac patients' recovery and adaptation to illness (Coyne & Smith, 1994; Thompson & Meddis, 1990; Williams et al., 1992). Spouses' participation in regular exercise may itself promote a supportive atmosphere between partners (Hoig et al., 2005). Many studies indicate that the patients' perception of how social support is

intended and whether the support meets the demands and needs of the situation is important when examining exercise adherence (Cohen & McKay, 1984; Collins & Feeney, 2000; Goldsmith, McDermott, & Alexandar, 2000).

Understanding the social support structure patients have in place may also help to improve program attendance and adherence. Women may not have the same family support system as men and may be expected to maintain a lifestyle at home that is not supportive of the behaviour changes required by cardiac rehabilitation programs (Stone & Arthur, 2005). Findings have also indicated that married patients who receive encouragement from their spouses and children are more likely to participate in cardiac rehabilitation (Ades et al., 1992b; Daly et al., 2002; Evenson et al., 1998; Lieberman et al., 1998).

Husak et al. (2004) reported that lower levels of social support were found to be associated significantly with 11% lower participation in cardiac rehabilitation after surgery. As well, being unmarried was associated with a significant 28% lower participation. Being married significantly increased participation among the men, but not among the women. Spousal support enhances emotional and cognitive readjustment, self-esteem, mastery, coping with physical restrictions as well as adherence to risk-reduction behaviours (Ben-Sira & Eliezer, 1990; Helgeson, 1991).

Self Efficacy. In health research, self-efficacy, defined as one's perceived ability to master arising demands and tasks successfully, has a long history as a predictor of successful behaviour change (Bandura, 1997). Research concludes that patients' perceived self-efficacy consistently mediate behaviour change and acts as a predictor of lifestyle change and adherence (Bock et al., 1997; Burns et al., 1998; Hellman, 1997; Litt

et al., 2002). Specifically, several studies have found that perceived self-efficacy modifies risk factors of cardiovascular disease and that self-efficacy is also predictive of cardiac rehabilitation compliance and exercise adherence (Ewart, 1995; Hellman, 1997; Horne, 1994; McAuley, 1993; Robertson & Keller, 1992; Vidmar & Robinson, 1994). Results indicate that self-efficacy increases over the course of the program which is positively associated with subsequent health behaviour change (Evon & Burns, 2004; Ewart, 1995; Scholz, Sniehotta & Schwarzer, 2005). However, there are also studies that did not find any relationship between self-efficacy and intentions, attendance or adherence in regards to cardiac rehabilitation programs (Bray & Cowan, 2004; Jeng & Braun, 1997; Scholz et al., 2005).

Self-efficacy to adhere to cardiac rehabilitation programs may be influenced by other participation barriers. For example, Blanchard et al. (2002) found that men had significantly higher barrier efficacy or confidence in their ability to perform a task under challenging conditions compared with women.

Enabling Barriers

Findings related to enabling factors suggest that people who live in an urban center with higher income and adequate health insurance use more health care services (Wan, 1982). Non-attendees of cardiac rehabilitation programs tend to be people living further away from the program, living alone and not having access to public transport (Grembowske & Conrad, 1986; Schulz & McBurney, 2000; Pell & Morrison, 1998).

Provider Oriented Barriers. Participation in cardiac rehabilitation programs is dependent on referral from a physician. Eligibility for a cardiac rehabilitation program is determined by the cardiac event suffered by the patient, with 80-85% of physicians

recommending that their patients follow an exercise program after an uncomplicated myocardial infarction (Hlatky et al., 1988). As well, physicians make referral decisions based on advice from other health care team members, including nurses and physical therapists (Burns et al., 1998). The strength of the primary physician's recommendation for involvement in cardiac rehabilitation programs has been found to be predictive of participation in these programs (Ades et al., 1992a; King, Humen, Smith, Phan, & Teo, 2001; King, Humen, & Teo, 1999). Only a small percentage of cardiac patients who are eligible are actually referred for outpatient cardiac rehabilitation programs (Burns et al., 1998). More precisely, Bittner, Sanderson, Breland and Green (1999) found that only 7% of cardiac patients who were eligible for cardiac rehabilitation were actually referred to a program.

Pathman, Konrad, Freed, Freeman and Koch (1996) reported that many physicians were not following correct guidelines for referral, with lack of awareness that guidelines for referral exist, disagreement with the content of the guidelines or irregular compliance to the guidelines. Also, Barber, Stommel, Kroll, Holmes-Rovner and McIntosh (2001) found that the provider's specialty predicts participation, as patients cared for by cardiologists are more likely to participate in cardiac rehabilitation. Cardiologists may be more inclined to refer every patient to cardiac rehabilitation or the patient may place more importance on the referral. Gender may also influence whether or not patients follow physician's recommendations to participate in cardiac rehabilitation programs. For example, Caulin-Glaser et al. (2001) found that physician written referral to cardiac rehabilitation programs after coronary revascularization procedures is less likely to be followed by women than men.

Rural Vs. Urban. Access and availability are primary factors in health care utilization (Johnson et al., 1998). In rural areas, there is often a lack of health care facilities and services based on population distribution and distance. As well, weather, road conditions, education, economic situation and values and beliefs of rural participants are also barriers to the use of formal health care services (Rosenblatt & Moscovice, 1982; Grembowkse & Conrad, 1986, Weinert & Long, 1990). Rural residents also tend to be older, poorer, have less education, be unemployed and have less health insurance coverage (Hornberger & Cobb, 1998; de Peuter & Sorensen, 2001).

Cardiovascular disease has been shown to be the leading cause of death in rural Americans (Johnson et al., 1998). Rurality also provides additional barriers to participation in cardiac rehabilitation. Research has noted that residents of rural areas are less likely to practice preventative health measures, use positive health practices with respect to nutrition and are less likely to have annual check-ups (Johnson et al., 1998). Rural residents also report having more medical conditions and are less likely to have medical insurance than urban residents (Hartley, Quam & Lurie, 1994). As well, medical care may involve considerable cost and inconvenience for rural participants resulting in persons not seeking care unless very ill or making appointments for preventative measures (McBain, 2005; Centres of Excellence for Women's Health, 2004).

Weinert, Johnson & Richardson (1998) found that almost 40% of rural residents reported they would not attend a cardiac rehabilitation program. Reasons cited included travel distance, lack of knowledge about program availability and lack of physician referral. On the contrary, research with rural residents has also shown that the support of family, friends and health professionals is a key factor in the management of long term

illness and they may be more likely to participate in a cardiac rehabilitation program despite distance (Johnson et al., 1998). However, it has been stated that most research in rural settings is incomplete and flawed, therefore giving a contradictory picture of the barriers to health care use (Johnson et al., 1998; Weinert & Burman, 1994).

Need Factors

Need factors are the objective and subjective aspects of the decision to use health services (Johnson et al., 1998). Previous research has shown that the need factor of poor health was the major determinant of health services utilization (Strain, 1991). People with better perceptions of their health, less severe illnesses and more functional ability used fewer health services.

Depression and Anxiety. Depression and anxiety often complicate cardiovascular events and cause distress. Depression has emerged as a risk factor for cardiovascular disease and has been shown to predict mortality following myocardial infarction (Frasure-Smith, Lesperance, Talajic, & Bourassa, 1999; Smith & Ruiz, 2002; Todaro et al., 2003; Yoshida et al., 1999). The prevalence of major depression is documented to range from 15% to 25% in patients with coronary artery disease (Arthur, 2006). Depression and anxiety lead to an increased risk of cardiovascular disease, while at the same time, lead to reduced adherence to treatment in cardiac patients (Carney, Freedland, Eisen, Rich, & Jaffe, 1995; Stone & Arthur, 2005). Day, Freedland & Carney (2005) recently showed that patients who endorse stress and other emotional states as causes tend to have elevated anxiety and depression scores. Perkins-Porras, Whitehead and Steptoe (2006) found that patients who reported family stress (23.4%) or stress due to

other illness (20.6%) in the four weeks preceding the cardiovascular incident were more likely than others to believe that stress contributed to their heart disease.

Whitmarsh et al. (2003) studied 61 participants of cardiac rehabilitation programs and found that those who attended the programs had greater anxiety and depression symptoms than those who did not attend. It was suggested that those who experience a greater degree of distress after discharge are more likely to attend cardiac rehabilitation. Although, Lavie and Milani (1995) found that rates of depression in women dropped from 23% to 12% and after completing a 12 week exercise program. As well, Michie et al. (2005) found that patients attending a cardiac rehabilitation program had decreased depression and anxiety at both 2 and 8 months after the end of the program compared to before.

With regards to gender, women are more likely than men to experience anxiety or depression, with depression reducing participation in cardiac rehabilitation (Ziegelstein, Bush & Fauerbach, 1997). Perkins-Porras et al. (2006) found that women had significantly higher anxiety scores in hospital compared to men (p=0.013). Similar results were reported by Todaro et al. (2005) who examined 110 people participating in cardiac rehabilitation and found there was a higher prevalence of female participants with a current depressive disorder compared with male participants, 28.6% to 9.3% respectively.

Illness perceptions and functional ability. Research has shown that people who participated in a rehabilitation program had increased work capacity and a greater tolerance for the activities needed for daily living (Fontana, Kerns, Rosenberg, Marcus & Colonese, 1986). However, medical factors and functional ability as well as

psychological factors such as the way a patient understands their illness and their perceptions of the illness influence attendance at cardiac rehabilitation (Cooper, Lloyd, Weinman & Jackson, 1999; French, Lewin, Watson & Thompson, 2005; Wyer S, Earll L, Joseph S, Giles M, Johnston M, 2001). Illness perceptions also may affect other outcomes such a person's health related quality of life (French et al., 2005).

Adherence

Despite evidence for effectiveness and patient referral, optimal attendance at cardiac rehabilitation is an international problem (Cooper, Weinman, Hankins, Jackson & Horne, 2006). It is estimated that 1.1 million coronary events will occur in the United States, with only 15-30% of those people taking part in a cardiac rehabilitation program (Blanchard et al., 2002; Daly et al., 2002; DeBusk, 1992). Typically, research has found that participation of men is limited to 25-31% of eligible patients, whereas the rate of participation of women is much lower at 11-20% of eligible patients (Ades et al., 1992b; Barber, Stommel, Kroll, Holmes-Rovner, & McIntosh, 2001; Jackson, Leclerc, Erskine, & Linden, 2005)

Not only do people resist taking part in cardiac rehabilitation programs, but participants do not adhere to the programs either. Low long term compliance is a major problem in cardiac rehabilitation with attrition rates ranging from up to 25% in the first three months to 30-60% in the first six months after starting the cardiac rehabilitation program (Bock et al., 1997; Oldridge, 1991; Oldridge & Streiner, 1990; Izawa et al., 2004; Radtke, 1989). As well, exercise maintenance rates are low for participants who have completed the cardiac rehabilitation program. Oldridge and Spencer (1985) used a self-report questionnaire with patients who had completed a six month cardiac

rehabilitation program and found a greater than 20% reduction of exercise maintenance after program completion.

Studies have consistently shown that women participating in cardiac rehabilitation programs have higher dropout rates and lower adherence rates to programs compared with men (Ades, et al., 1992b; Halm et al., 1999; O'Callaghan, 1984; Oldridge et al., 1992; Schuster & Waldron, 1991). Blanchard et al., (2002) found that men had a significantly higher exercise adherence rate compared with women, 88% and 80% adherence rates respectively. Similar results were reported by Halm et al. (1999) who found that women in their program had an adherence rate of 75% while men had an adherence rate of 88%. Furthermore, Schuster and Waldron (1991) found that only 5% of men dropped out of a cardiac rehabilitation program compared to 14% of women.

Walking programs, often a component of phase III of the cardiac rehabilitation programs, have appeared to have higher adherence rates than other programs forms of aerobic activity (Pollock, 1988). Walking is considered to be a moderate-intensity exercise and can provide health benefits if performed for thirty minutes or more on most days of the week (Pollock & Froelicher, 1990). However, the benefits that a walking program can provide will not occur if the program is not maintained (Hovell et al., 1989).

The Province of Newfoundland and Labrador

Cardiovascular disease remains the leading cause of both sickness and death in Canada. In 1999, Newfoundland and Labrador had the highest mortality rates for both myocardial infarction and stroke in the Atlantic Provinces (Government of Newfoundland and Labrador, 2002). Newfoundland has the highest mortality rate for acute myocardial infarction (71.9 per 100,000) in all of Canada (60.2 per 100,000)

(Government of Newfoundland and Labrador, 2002). In terms of gender, both Newfoundland men and women had the highest mortality rates across Canada from 1995-1999, 399.2 per 100,000 and 247.8 per 100,000 respectively (Heart and Stroke Foundation, 2003). As well, Newfoundlanders reported a higher prevalence of all modifiable risk factors (such as physical inactivity, smoking, being overweight, etc.) than the Canadian population overall (Heart and Stroke Foundation, 2003).

Overall, coronary artery disease accounted for an expenditure of $7.8 billion in Canada in 1993 (Brown, Taylor, Noorani, Stone & Skidmore, 2003). Cardiac rehabilitation programs have been promoted to enhance recovery from cardiovascular disease and even though programs have proven to be beneficial, there is an overall effort to keep health care costs at a minimum. Each province in Canada has their own health care program and health promotion agenda. Secondary health care services such as cardiac rehabilitation are not covered by the Canada Health Act, with all provinces and territories providing and paying for certain services. This accounts for the regulation and range of services provided in each province and territory (Health Canada, 2005).

Newfoundland established a regionalized delivery of health care in 1994. It was further restructured in 2003-2004 and again in 2005. (Canadian Institute for Health Information, 2005). Health spending by the Newfoundland and Labrador government is influenced by four main factors as reported by the Government of Newfoundland and Labrador, Department of Health and Community Services found in their Health Scope publication (2004, p.4),

> Newfoundland is challenged in all four main areas; an aging population which uses more health services, vast geography and population widely dispersed, high rates of several chronic health conditions and risk factors, extensive provincial

infrastructure of health facilities, as well as a health human resource workforce of over 20,000 individuals.

These factors directly relate to the higher rates of cardiovascular disease in Newfoundland as they are a major reason for hospitalizations and a major cost driver for the health system (Department of Health and Community Services, 2004). Interventions such as cardiac rehabilitation programs are cost effective methods of reducing risk factors and mortality among an entire population.

The actual components of cardiac rehabilitation programs vary across Canada depending on available local resources, although the Canadian Association of Cardiac Rehabilitation has set guidelines for the programs to follow (Brown et al., 2003). In Canada, cardiac rehabilitation program structures are highly variable with programs lasting from 2 months to an indefinite period and patient contact ranging from 1 to 3 sessions per week (Reid et al., 2004; Wolfe et al., 1990). Programs vary from province to province and also from region to region.

In February 2000, the Peninsula Health Care Corporation launched their new and improved Cardiac Rehabilitation Program (NLHHP, 2006). Two main cardiac rehabilitation programs exist in Newfoundland, both located on the eastern peninsula. One is run through Carbonear General Hospital and the other through the Healthcare Corporation of St. John's. As well, community programs are also run across the province such as the Heart to Heart program.

In the province of Newfoundland and Labrador, as of 2001, 53.5% of the population resides in rural and small town areas (Canadian Rural Partnership, 2005). According to the recent census, rural areas had "the lowest number of health care

providers in the province (11.9 per 1,000 in 2001), with just 0.8 professional health care providers (e.g., physicians) per 1,000 residents" (Canadian Rural Partnership, 2005). Presently, supervised cardiac rehabilitation programs are offered only in the urban areas of Newfoundland, excluding the health care needs of rural Newfoundlanders. Given these circumstances, a study of the cardiac rehabilitation program in St. John's Newfoundland is timely.

Summary

Chapter two has reviewed the literature and research completed on factors that predict peoples' participation and adherence to cardiac rehabilitation programs. Specifically it described the research on cardiovascular disease, cardiac rehabilitation programs, as well as benefits and barriers to participation in the programs. The chapter outlined specific predisposing, enabling and need barriers: age, gender, socioeconomic status, social support, self-efficacy, provider oriented barriers, rurality, depression and anxiety, as illness perceptions. It has also outlined the existing literature and research examining adherence issues with cardiac rehabilitation. The chapter concluded by identifying specific factors for the province of Newfoundland and Labrador where the current study was conducted. Chapter three will provide the study's methodology and procedure, as well as the conceptual framework used.

CHAPTER 3: METHODS

Overview

The previous chapter provided a literature review that examined factors predicting participants' utilization and adherence to cardiac rehabilitation. This chapter will describe and outline the study's methodology used to examine this topic. The chapter is divided into several sections that include research design, participants, ethics approval, procedure, data collection, instruments, coding, data analysis and concludes with a summary.

Research Design

The evaluation of factors affecting participants' use of the cardiac rehabilitation program in St. John's, Newfoundland was achieved through a cross-sectional, one group, two observation, survey research design. The primary purpose of this exploratory study was to examine the barriers to participation and adherence of patients enrolled in the cardiac rehabilitation program offered by the Healthcare Corporation of St. John's, Newfoundland. This research design was chosen as the study sought to cross-validate a previous study by Johnson, Weinert and Richardson (1998) and to investigate potential gender differences among factors influencing participants' use of a local cardiac rehabilitation program. As described in the preceding chapter, Johnson et al. (1998) used a variety of instruments to access the predisposing, enabling and need factors of the 254 participants in their study. As well, Johnson et al (1998) used correlations, multiple regression analysis and logistic regression statistics in order to explain cardiac rehabilitation utilization and adherence.

Participants

A purposeful, convenience sampling technique was used in this the study. Potential participants who had suffered a cardiac incident within the past year were initially contacted at the cardiac rehabilitation referral session (the outpatient clinic). A total of 49 individuals were contacted and invited to participate. Of the 49 individuals, 9 declined to sign the consent and 12 took the first questionnaire and consent forms but did not return the materials. The study's participants consisted of a total of 28 patients, females (n = 13) and males (n = 15). Not all of the participants completed the second questionnaire, so the sample size was smaller (N = 18), females (n = 9) and males (n = 9) for the results from the second questionnaire. Participants ranged in age from 25 to 80 years of age. Males ranged in age from 37 to 70 years of age (M = 58.33, SD = 9.68). Women ranged in age from 25 to 80 years of age (M = 59.31, SD = 15.77). All participants were recently diagnosed cardiac patients referred to join the cardiac rehabilitation program run by the Healthcare Corporation of St. John's, Newfoundland. All participants volunteered to be involved in the study and were informed of the study's general purpose prior to participation.

Ethics Approval

The study entitled "Factors Predicting Participant's Use of Cardiac Rehabilitation Programs" received ethics approval from Memorial University of Newfoundland's Interdisciplinary Committee on Ethics in Human Research on August 4th, 2006 (Appendix A).

Procedures

Preliminary discussions were held with the Director of the Cardiac Rehabilitation Program operated by the Healthcare Corporation of St. John's in order to gain background knowledge about the program. Upon obtaining background information, permission was sought to conduct the research. Once permission was granted, both the Cardiac Care Program Director and the Cardiac Rehabilitation Program Director met with the researcher to review and make suggestions and recommendations to the proposed questionnaire packets and consent forms. Once the final questionnaire packet had been designed and approved, data collection began.

Data Collection

Patients who had endured a cardiac incident within the past year were invited to participate if they had been referred to the outpatient clinic. Recruitment into the study occurred between September 2006 and December 2006 at the outpatient clinic. Each patient that came to the cardiac rehabilitation referral session was contacted personally by the researcher at the outpatient clinic and asked if they would like to voluntarily participate in a research study that was being conducted to examine reasons why people may or may not participate in cardiac rehabilitation. Participants were fully informed of the procedures in accordance with the Interdisciplinary Committee on Ethics in Human Research (ICEHR) at Memorial University. Additionally, patients were informed that they would not be penalized should they decide not to participate in this study or answer all the questions on the questionnaire. If participants agreed to participate and signed the study consent form (Appendix B), they were handed the first questionnaire packet and

filled it out at the office immediately before departing the clinic. If they did not have time to fill out the questionnaire, they were encouraged to take it with them, with instructions to return it upon their first cardiac rehabilitation session. The second questionnaire packet was handed to participants at the cardiac rehabilitation program after they had attended for approximately two months. Adherence to the program was measured through weekly attendance records kept by the director of the cardiac rehabilitation program. Any participant that dropped out of the program was contacted by the researcher if they had signed the additional consent form allowing the participant to be contacted should they drop out of the program at any time.

Instruments

The proposed study models and cross-validates research conducted by Johnson, Weinert & Richardson (1998) which took place in the western USA. The methods from the Johnson, Weinert and Richardson (1998) study were followed as closely as possible although some instruments were modified in order for a more concise questionnaire packet and to meet the approval of the cardiac care director and cardiac rehabilitation program director. The Personal Resource Questionnaire (Weinert, 1987) used to measure social support in the Johnson et al. study was replaced by the shorter Medical Outcomes Survey Social Support Questionnaire (Sherbourne & Stewart, 1991). Johnson et al. used the Health Conceptions Scale (Laffrey, 1986) and the Economic Adequacy Scale (Lobo, 1982) which were removed from the present study in order to adjust the length of the overall questionnaire. Two self-administered questionnaires were used to collect data in this evaluation. The first questionnaire packet examined participants' predisposing,

enabling and need factors, whereas the second questionnaire packet examined the remaining enabling and need factors.

Specifically, the first survey instrument administered at the outpatient clinic, was a questionnaire packet consisting of:

(i) Demographic information of name, age, gender, highest education achieved, employment status, marital status and number of children.

(ii) Intent to participate in the cardiac rehabilitation program using responses ranging from 1 (*definitely will not attend*) to 4 (*definitely will attend*).

(iii) Participants' perception of their global health at the moment on a scale of 1 (*poor*) to 4 (*excellent*).

(iv) Self-administered social support questionnaire using the Medical Outcomes Study Social Support Questionnaire (Sherbourne & Stewart, 1991) consisting of 19 questions with 4 subscales and an additional item: emotional/informational support, tangible support, affectionate support, positive social interaction and an additional item. Respondents were asked to rate how often each kind of support is available to them when they need it (e.g., "Someone you can count on to listen to you when you need to talk"). The questionnaire uses a 5 point Likert rating scale ranging from 1 (none of the time) to 5 (all of the time). Scores were computed for each subscale by calculating the average of the scores for each item in the subscale. To obtain an overall support index, the average of the scores for all 18 items and the additional item were calculated. Authors have found adequate reliability (Cronbach's alpha >.91) for each social support measure in the questionnaire

(v) as well as high convergent and discrimination validity of items (Sherbourne & Stewart, 1991). In the current study, the MOS social support scale demonstrated excellent internal reliability (Cronbach's alpha = .97).

(vi) Self-administered health locus of control questionnaire using the Wallston and Wallston (1978) Multidimensional Health Locus of Control Scale consisting of 18 questions. Respondents were requested to rate the extent they agreed or disagreed with statements about their medical condition (e.g., "If I get sick, it is my own behaviour which determines how soon I get well again"). The questionnaire uses a rating scale from 1 (*strongly disagree)* to 6 (*strongly agree)* on three subscales: internal locus of control, powerful others locus of control and chance locus of control. Scores can range from 6-36 for each subscale, with all of the subscales being independent of one another. A total MHLC score is not used (Wallston & Wallston, 1978). Reliability has been found with alpha coefficients ranging from .71 to .85 for the internal locus of control subscale, .67 to .83 for the powerful others locus of control subscale and .69 to .84 for the chance locus of control subscale (Johnson, Weinert & Richardson, 1998). Construct, content and face validity have been found if the questionnaire is used properly (Wallston, 2005). In the current study, the MHLC scale demonstrated good internal reliability (Cronbach's alpha = .77).

(vii) Self-administered mood scale using the Profile of Mood States (POMS) (McNair, Lorr & Droppelman, 1992) consisting of 68 moods. Participants were asked to rate each mood depending on how they felt at the moment (e.g., "friendly", "tense"). Each mood was rated from 1 (*not at all)* to 5 (*extremely*).

The questionnaire consists of 7 subscales: Tension, depression, anger, vigour, fatigue, confusion and others. Each adjective is awarded the score as circled except *relaxed* and *efficient* should be reversed. A Total Mood Disturbance can be calculated by adding the raw scores from tension, depression, anger, fatigue and confusion and then subtracting the vigour score. The total score can range from -24 to 177, with lower scores indicative of people with more stable mood profiles. Reliability has been reported with coefficient alphas ranging from .90 to .95 as well as construct and content validity (Johnson, Weinert & Richardson, 1998). In the current study the POMS scale demonstrated excellent internal reliability (Cronbach's alpha = .92).

(viii) Questions assessing participants' rurality with the MSU Rurality Index (Weinert & Boik, 1995), scoring assigned to each participant using population of the county of residence and distance to emergency care.

The study questionnaire packet can be found in Appendix C.

The second survey instrument, administered at the Cardiac Rehabilitation Program was a questionnaire packet comprising of:

i) Question assessing participants' opinion of their illness severity on a scale of 1 (*not serious*) to 4 (*very serious*).

ii) Question assessing how much the participants' cardiac incident has affected their lifestyle on a scale of 1 (*Has had a very negative effect*) to 5 (*Has had a very positive effect*).

iii) Difficulty of finding transportation to the cardiac rehabilitation program on a scale of 1(*Not at all difficult*) to 4 (*Very difficult*).

iv) Open ended questions assessing participants' belief of how convenient and risky is travel to the cardiac rehabilitation program.

v) Open ended questions assessing particpants' travel distance and time to the cardiac rehabilitation program.

vi) Participants' functional ability to complete daily tasks using the Older American Resources and Services, Instrumental Activities of Daily Living (IADL) (Fillenbaum, 1985). Participants were requested to rate the extent to which they needed help for each of the 7 activities (e.g., "using the telephone", "grocery shopping"). Items were scored from 2 (*Needing no help*) to 0 (*Unable to do at all*). The total IADL score is calculated by summing together the scores on the seven items. The score can range from 14 (totally independent) to 0 (totally dependent). It has a test-retest reliability ranging from .81 to .85 as well as concurrent and construct validity (Johnson, Weinert & Richardson, 1998).

The study questionnaire packet can be found in Appendix D.

Coding

Completed questionnaires were coded by the investigator and entered into the Statistical Packages for the Social Sciences (SPSS) version 15.0 for Windows. To minimize human error in the data entry process, the investigator entered all items into

SPSS and verified them on 3 separate occasions. As well, effect sizes for the analysis of variance (ANOVA) will be measured using the Effect Size Generator version 2.3 for Windows.

Any response on the questionnaire which was not numerical, such as marital status, gender, employment status and highest education achieved was assigned a numerical value. For example, employment status was coded for data entry, "unemployed" was assigned the value 1, "currently employed" was assigned the value 2, "retired" was assigned the value 3 and "on leave" was assigned the value 4. As well, the dependent variables in this study were "sessions" and "rehab". Rehab was a dichotomous variable with 0 assigned for no participation in the rehabilitation program and 1 assigned for participation in any rehabilitation sessions.

Data Analyses

Quantitative measures such as descriptive statistics of frequency as well as percentage of intent, participation and number of sessions attended were calculated. Analysis of variance (ANOVA) was calculated in order to determine if any gender differences exist in the cardiac rehabilitation sample for each of the Medical Outcomes Social Support Survey (MOS), Multidimensional Health Locus of Control scale (MHLC) and the Profile of Mood States (POMS). Descriptive statistics as well as multiple regression was conducted for the predictor variables (predisposing, need and enabling factors) and dependent variable of number of cardiac rehabilitation sessions attended. Logistic regression was performed as an alternative statistical strategy in order to allow for the use of the total sample and to replicate the study by Johnson et al. (1998). The

logistic regression model regresses all predictor variables (predisposing, need and enabling factors) on the dependent variable of rehab (whether participants attended/did not attend rehabilitation).

Summary

Chapter three has outlined the methodology employed in the current research study. This chapter also described the participants and the methodology that was used in this study. Additionally, this chapter discussed the data collection, instrumentation, coding and data analysis. Chapter four will present the results obtained from this study. The two research questions outlined in chapter one will be answered, specifically

1. What are the predisposing, enabling and need factors that cardiac rehabilitation program participants face?

2. Do differences exist between the predisposing, enabling and need factors faced by male as compared to female cardiac rehabilitation program participants?

CHAPTER 4: RESULTS

Overview

The previous chapter overviewed the methodology used to examine factors predicting participants' utilization and adherence to cardiac rehabilitation programs. This chapter will present the results of the analyses that were performed to meet this study's objectives. The chapter is divided into several sections and begins with a demographic description of the participants. It also provides a report of the participants' descriptive statistics (means, standard deviations, and frequencies) for each demographic variable as well as descriptive statistics for the remaining predisposing, enabling and need factors.

The chapter then presents correlations for the dependent variables of rehabilitation and sessions attended with the predictor variables. One series of one-way analysis of variances (ANOVAs) were performed on each of the Profile of Mood States (POMS), Medical Outcomes Social Support Survey (MOS) and Multidimensional Health Locus of Control (MHLC) questionnaires subscales in regards to gender. The significant main effects will be identified and interaction effects will be presented. A multiple regression analysis will be presented which regresses the number of rehabilitation sessions attended on all of the predisposing, enabling and need variables. The chapter concludes by presenting a logistic regression model which regresses whether participants attended rehabilitation sessions or not on the predisposing, need and enabling factors. The small sample size within this study ($N = 28$) should be noted as it is a major limitation to the interpretation of the results.

Descriptive Statistics

Demographic Information

The study's participants consisted of patients who had suffered a cardiac incident within the past year (N – 28), females (n = 13) and males (n = 15). Participants ranged in age from 25 to 80 years of age (M = 58.8, SD = 12.62). Of all the participants 3.6% were 25 - 35 years of age, 10.8% were 36 45 years of age, 21.5% were 46 – 55 years of age, 32.2% were 56 - 65 years of age, 28.6% were 66 75 years of age and 3.6% were 76 85 years of age (See Figure 4.1). Specifically, males ranged in age from 37 to 70 years of age (M – 58.3, SD = 9.68). Women ranged in age from 25 to 80 years of age (M – 59.3, SD = 15.77) (See Figure 4.2).

Participants in this sample were moderately educated with 82.1% having completed at least high school. Specifically, 17.9% completed grade school, 39.3% completed high school, 7.1% completed college, 32.1% completed university and 3.6% completed post graduate training. Twenty percent of the sample was unemployed, 35.7% were currently employed, 39.3% were retired and 3.6% were on medical leave. The sample was predominately married (67.9%), while 10.7% were single, 3.6% were divorced, 14.3% were widowed and 3.6% were separated. The majority of the sample had three children or less (67.9%) while 21.4% had four children and 10.8% had more than four children.

The majority of the sample (85.7%) lived ten kilometres or less away from the referral outpatient clinic, followed by 3.6% living 15 kilometres away and 7.2% living more than 15 kilometres away. Median travel time was ten minutes to the referral

outpatient clinic, and 50% of the sample perceived themselves to live in a medium size city, 28.6% in a large city and 21.4% in a small town, small rural town or rural area.

Demographics by Gender. Females were more educated than males with 61.5% of the sample completing at least a university or college degree as compared to 26.7% of males. Although, the majority of the sample had completed at least a high school education (males = 72.7% and females = 84.6%). More males than females in the sample were currently married, 80% and 53.4% respectively. Twenty three percent of females were widowed and only 6.7% males were widowed. The majority of the sample had at least one child (92.8%), with 66.7% of males and 69.2% of women having three or less children. The majority of the sample, 86.7% of males and 84.6% of females, lived within ten kilometres of the referral outpatient clinic. Of the 67.8% of the sample who perceived approximate travel time to the clinic to be 10-20 minutes, 66.7% were males and 69.2% were females.

Intent to participate

Findings related to the intent to participate in the cardiac rehabilitation program showed that 23 (82.1%) participants indicated that they would "definitely attend" the program. Of the four (14.3%) that indicated they would "probably attend," two (7.1%) indicated lack of transportation, one (3.6%) indicated that the early morning session times might deter them and one (3.6%) did not site a reason. Only one (3.6%) participant selected "definitely will not attend," indicating they could not avail of the program time frame until the summer time (See Figure 4.3). More males (93.3%) indicated they would "definitely attend" the cardiac rehabilitation program then females (69.2%) (See Figure 4.4).

Participation in cardiac rehabilitation

Of the 28 participants, only 17 (60.7%) actually attended at least one of the cardiac rehabilitation sessions. Of the 17 actual participants in the cardiac rehabilitation program, one (5.8%) completed one to five sessions, three (17.6%) completed six to ten sessions, two (11.7%) completed 11 to 15 sessions, three (17.6%) completed 16 to 20 sessions, five (29.4%) completed 21 to 25 session and three (17.6%) completed 26 to 30 sessions. A second questionnaire packet was mailed out to those who did not attend or had attended a few cardiac rehabilitation sessions and total of 18 (64.3%) participants completed the second questionnaire packet. Therefore, information on the second questionnaire (enabling factors of environment and accessibility as well as the need factors of emotional health, illness severity and physical functioning) will have only been completed by those who completed the questionnaire ($N = 18$), females ($n = 9$) and male ($n = 9$).

Barriers to Cardiac Rehabilitation

The primary purpose of this exploratory study was to examine the barriers to participation and adherence of patients enrolled in the cardiac rehabilitation program offered by the Healthcare Corporation of St. John's, Newfoundland. To determine the predisposing factors (social support and locus of control), enabling factors (transportation and accessibility) and need factors (emotional health, illness severity and functional ability) that cardiac rehabilitation program participants face a series of descriptive statistics were calculated.

Predisposing Factors

Social Support. Overall, the sample (N = 28) had lower scores for the emotional support subscale than the other subscales (tangible support, affectionate support and positive social interaction) on the Medical Outcomes Survey (MOS) Social Support scale. The sample had a lower average on the emotional/informational support subscale (M = 3.93, SD = 1.06) than the other three subscales of tangible support (M = 4.29, SD = 1.03), affectionate support (M = 4.36, SD = .92) and positive social interaction (M = 4.20, SD = .90). The sample generally had social support systems available to them measured by the overall index of support (M = 4.13, SD = .89). However, females (n = 13) reported lower averages on all four subscales and the overall index of support than did males (n = 15). Females had a lower average on the emotional/informational support subscale (M = 3.74, SD = .91), the tangible support subscale (M = 3.83, SD = 1.2), the affectionate support scale (M = 4.1, SD = .89), the positive social interaction subscale (M = 3.85, SD = .93) and the overall index of support (M = 3.86, SD = .89) compared to males (M = 4.1, SD = 1.18; M = 4.7, SD = .63; M = 4.58, SD = .93; M = 4.51, SD = .76; M = 4.36, SD = .86, respectively) (See Figure 4.5).

Multidimensional Health Locus of Control. Using the Multidimensional Health Locus of Control (MHLC) scale, the sample (N = 28) believed the main locus of control for their illness to be internal (M = 27, SD = 4.91). Powerful others ranked second (M = 23.71, SD = 6.72) while the chance subscale scored the lowest (M = 14.82, SD = 6.16). More females (n = 13) believed their illness was due to chance (M = 16.54, SD = 3.23) than males (n = 15) (M = 13.33, SD = 7.69). More males scored higher on the internal subscale (M = 27.73, SD = 3.85) compared to females (M = 26.15, SD = 5.97). As well,

more males scored higher on the powerful others subscale (M = 25.47, SD = 6.26) compared to females (M = 21.69, SD = 6.91) (See Figure 4.6).

Enabling Factors

Transportation. Participants (N = 18) rated the difficulty of finding transportation to the program by a question on the second questionnaire. The majority of participants (89%) indicated it was not at all difficult to find transportation to the cardiac rehabilitation program. One participant (5.6%) found it very difficult and one participant (5.6%) found it moderately difficult to find transportation to the cardiac rehabilitation program. All the men (100%) found transportation not at all difficult to the program as compared to women (77.7%).

Accessibility. Accessibility of the cardiac rehabilitation program was measured by four questions assessing convenience of traveling to the program, degree of travel risk, number of kilometres from residence to the program and number of travel minutes (N = 18). The majority of participants (88.9%) indicated that the convenience of traveling to the program was "fine," "good" or "not a problem". Only two participants (11.1%) indicated that it was "not very" convenient to travel to the cardiac rehabilitation program. Of all the men (n = 9), 100% indicated that it was convenient to travel to the cardiac rehabilitation program as compared to 89% of the women (n = 9). The majority of participants (77.7%) indicated that travel to the program was not risky, whereas one participant (5.6%) indicated travel was slightly risky and three participants (16.7%) indicated that the winter weather made the travel risky to attend the cardiac rehabilitation program. Again, of all the men, 100% indicated that it was not at all risky to travel to the program as compared to 55.5% of the women. As for number of kilometers traveled to

the program and approximate travel time, the majority of participants (83.3%) lived within two - ten kilometres from the cardiac rehabilitation program and 88.8% lived within 15 minutes from the program. Both women and men lived approximately the same distance from the program with women (M = 6.1 kilometres, SD = 5.49) and men (M = 8 kilometres, SD = 8.54). As well, approximate travel time in minutes to the cardiac rehabilitation program was very similar for women (M = 11.67, SD = 5) and men (M = 11.67, SD = 5.6).

Degree of Rurality. The degree of rurality could not be properly assessed in this study as all participants lived within 30 kilometres of the cardiac rehabilitation program. The referral process policy that is in place for incoming participants to the cardiac rehabilitation program restricts access to patients who lived within 45 kilometers of the city center. Weinert and Boik (1995) state that "because the MSU Rurality Index is calculated using only county population and distance to emergency care, it is not intended for use when all participants in a study live in the same county." (p.454)

Need Factors

Emotional Health. Using the Profile of Mood States (POMS) scale, the sample (N = 28) had relatively low raw scores on the subscales of anger (M = 3.61, SD = 5.09) and confusion (M = 6.54, SD = 4.20). The sample had higher raw scores for the other subscales of depression (M = 7.04, SD = 8.62), fatigue (M = 7.21, SD = 5.27), tension (M = 9.46, SD = 6.36) and vigour (M = 13.39, SD = 6.00). Males (n = 15) and females (n = 13) were in relatively the range of scores for each subscale except for the vigour subscale with males (M = 15.27, SD = 6.341) achieving a higher raw score than females (M = 11.23, SD = 4.97) (See Figure 4.7).

Illness Severity. Two questions were used to evaluate illness severity on the second questionnaire, with one missing data variable ($N = 17$). The first question, assessing participant's perception of the seriousness of their current cardiac condition, showed 41.2% rated their current cardiac condition as moderately serious, while 29.4% rated their current cardiac condition as slightly serious. Three participants (17.6%) rated their current condition as not serious, while only two (11.8%) rated their condition as very serious. More men felt their current condition was very serious (22.2%) as compared to women (0%). As well, more women felt their current cardiac condition was not serious or slightly serious (50.0%) than men (44.4%).

The second question asked participants how much their illness had affected their lifestyle. The majority of participants (52.9%) indicated that their cardiac condition had had a positive effect on their lifestyle. Another 23.5% answered that their cardiac condition had a negative effect of their lifestyle. As well, 11.8% indicated that their cardiac condition had no effect on their lifestyle while one (5.9%) participant indicated it had a very negative effect and one (5.9%) participant indicated it had a very positive effect on their lifestyle. More men felt that their cardiac condition had a very negative or negative effect on their lifestyle (33.3%) as compared to women (25%). Yet, the majority of both men (66.7%) and women (50%) felt their cardiac condition had a positive effect or very positive effect on their lifestyle. Only women (25%) felt their cardiac condition had no effect on their lifestyle.

Functional Ability. In order to measure functional ability, participants ($N = 18$) were to indicate whether they needed no help, some help or were unable to do any of the specified tasks using the IADL. Scores range from 0 (totally dependent) to 14 (totally

independent). For using the telephone, preparing meals, taking medications and managing money, 100% of the participants indicated they needed no help. For going places beyond walking distance, 77.8% indicated they needed no help while 22.2% indicated they needed some help. For grocery shopping, 83.3% indicated they needed no help while 16.7% indicated they needed some help. For doing housework, 61.1% indicated they needed no help while 38.9% indicated they needed some help. Overall, every participant scored 11 or higher, meaning they are almost or are totally independent. The majority of participants (55.6%) scored a 14 (totally independent). Four participants (22.2%) scored 13, two participants (11.1%) scored a 12 and two participants (11.1%) scored an 11. When taking into account all seven questions, males answered they needed some help 9.5% of the time and women indicated they needed some help 12.7% of the time (See Figure 4.8).

Correlation of major variables

The dependent variables in this study were "sessions" and "rehab". Sessions indicated the total number of rehabilitation sessions attended ranged from zero to twenty six. Rehab was a dichotomous variable with 0 assigned for no participation in the rehabilitation program and 1 assigned for participation in any rehabilitation sessions. The predictor variables were the predisposing and need factors. Enabling factors were not included as transportation and accessibility were questions without a set response and degree of rurality did not apply to the sample for this study. All predictor variables were continuous except for gender, employment status, marital status and intent to participate.

Effect sizes for all correlations were measured using the correlation coefficient. In social science, effect size measures are usually $r = .10$ (small effect size), $r = .30$ (medium effect size), and $r = .50$ (large effect size) (Colliver, 2007). Moderate effect sizes ($r = .30$) were expected.

The bivariate relationship of the predictor variables and the two dependent variables was examined. Zero order correlations (Pearson) of predisposing, enabling and need variables determined whether variables differed according to the study variables, whether cardiac rehabilitation was attended and number of rehabilitation sessions attended. As can be seen in Table 4.1, while there were correlations between the predisposing, enabling and need variables, more education was the only variable approaching significance of correlation with being more likely to participate in a rehabilitation program ($r = .337$, $p = .08$).

Table 4.1 ***Correlation of Predictor Variables and Dependent Variables***

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	Sessions	Rehab
Predisposing Factors															
1. Age		.039	.459*[b]	.148	-.185	.417*[b]	-.034	-.287	-.019	.001	-.080	-.452*[b]	-.282	.167	.101
2. Gender [a]			.209	-.194	.336[b]	-.053	-.288	-.163	.264	-.285	-.311[b]	.119	-.108	.042	.096
3. Marital status				.033	-.024	.160	-.234	-.015	-.094	.054	.131	-.052	-.006	-.095	-.061
4. Employment status					-.054	.074[c]	-.032	.339[b]	-.283	.326[b]	.051	-.360[b]	.597**[c]	-.212	-.045
5. Education						-.524**[c]	-.122	-.049	-.161	-.161	.258	-.098	.563*[c]	.133	.337[b]
6. Family size							.001	.102	.420*[b]	.123	-.129	.218	-.460[b]	-.045	-.250
7. Social support								.263	-.019	.298	.173	-.152	.308[b]	.279	.306[b]
8. Internal locus of control									.029	.506**[c]	.163	.316b	.445[b]	.061	-.031
9. Chance locus of control										.299	-.021	.252	-.209	-.272	-.305[b]
10. Powerful others locus of control											.341b	.096	.592**[c]	-.293	-.292
11. Intent to participate												.019	.893**[c]	-.018	.176
Need Factors															
12. Emotional health													-.332[b]	-.151	-.312[b]
13. Functional ability														-.124	.288

[a] 0 = female, 1 = male
* $p < .05$. ** $p < .01$.
[b] $r \geq .30$
[c] $r \geq .50$

Gender Differences Among Predisposing, Enabling, and Need Factors

This study sought to determine whether differences exist between the predisposing, enabling and need factors faced by male as compared to female cardiac rehabilitation program participants. Predisposing factors included demographic and structural socio-information, social support using the Medical Outcomes Social Support Survey (Sherbourne & Stewart, 1991), health locus of control measured by the Multidimensional Health Locus of Control Scale (Wallston and Wallston, 1978) and one single question assessing intent to participate. Enabling factors included accessibility measured by four questions, transportation measured by one question and degree of rurality measured using the MSU Rurality Index (Weinert & Boik, 1995). Finally, need factors used in this analysis include global health status measured by a single question, illness severity measured by two questions, emotional health assessed using the Profile of Mood States (McNair, Lorr & Droppelman, 1992) and functional ability operationalized using the Instrumental Activities of Daily Living (Fillenbaum, 1985).

A one-way analysis of variance (ANOVA) was performed for each of the Multidimensional Health Locus of Control (MHLC) (Wallston & Wallston, 1978), Medical Outcomes Study Social Support Questionnaire (MOS) (Sherbourne & Stewart, 1991) and the Profile of Mood States (POMS) (McNair, Lorr & Droppelman, 1992) scales in regards to the independent variable of gender (between group comparison) for the cardiac rehabilitation sample. Assumptions of a one-way analysis of variance (ANOVA) are that error terms are randomly, independently and normally distributed with a mean of zero and a common variance. Data were screened to determine whether or not the assumptions of ANOVA were met. According to the Kolmogorov-Smirnov test, all

variables within the series of analysis of variances were normally distributed. With gender being the independent variable, the following dependent variables were not normally distributed according to Kolmogorov-Smirnov test: emotional, tangible, affectionate and social interaction subscales along with overall index of support on the MOS, depression, anger and fatigue subscales on the POMS. The assumption of homogeneity of variance was tested using Levene's statistic. For all ANOVA analyses the variances between males and females were equal. The exception to homogeneity of variances was the tangible subscale on the MOS and the fatigue subscale on the POMS.

Cohen's *d* was used as a measure of effect size for all ANOVA analyses. As Cohen (1988) stated, *d* values of .20, .50, and .80 are conventionally described as small, medium, and large, respectively. Moderate associations ($d = .50$) were expected.

Multidimensional Health Locus of Control Scale

No significant differences were found for any of the subscales (internal, powerful others and chance) in regards to gender (See Table 4.2).

Table 4.2 ***Summary of ANOVA Results for the MHLC Subscales and the Dependent Variable of Gender***

	F	*p*	*D*	*95% Confidence Interval for Mean*	
				Lower Bound	*Upper Bound*
Internal Subscale	.712	.407	.315	-.433	1.062
Powerful Others Subscale	2.302	.141	.574	-.184	1.331
Chance Subscale	1.953	.174	.545	-.212	1.301

* $p < .05$

Medical Outcomes Study Social Support Questionnaire

No significant differences ($p > .05$) were found for the MOS overall index in regards to the independent variable of gender (See Table 4.3). As well, no significant

gender differences were found for the emotional or affectionate subscales. Significant differences ($p < .05$) were found for the social interaction subscale ($F_{(1, 26)} = 4.32$, $p = .048$, $d = .781$) and the tangible subscale ($F_{(1, 26)} = 5.98$, $p = .022$, $d = .906$). Females scored lower averages on both the positive social interaction subscale ($M = 3.85$, $SD = .93$) and the tangible subscale ($M = 3.83$, $SD = 1.2$) compared to males ($M = 4.51$, $SD = .76$; $M = 4.7$, $SD = .63$, respectively). As well as being significant, differences for both the social interaction subscale and the tangible subscale had large effect sizes ($d = .781$ and $d = .906$, respectively).

Table 4.3 ***Summary of ANOVA Results for the MOS Scale and the Dependent Variable of Gender***

	F	*p*	*D*	*95% Confidence Intervals for Mean*	
				Lower Bound	*Upper Bound*
MOS overall index	2.344	.138	.556	-.200	1.313
Social Interaction Subscale	4.315	.048*	.781	.011	1.552
Affectionate Support Subscale	1.9	.180	.523	-.232	1.279
Tangible Support Subscale	5.982	.022*	.906	.113	1.686
Emotional Support Subscale	.792	.382	.341	-.408	1.089

* $p < .05$

Profile of Mood States Scale

No significant differences were found on the overall total mood disturbance in terms of gender (See Table 4.4). As well, no significant gender differences were found for the five subscales of tension, depression, anger, fatigue and confusion. The subscale of vigour was approaching significance ($F_{(1, 26)} = 3.43$, $p = .075$, $d = .709$). Males scored higher on the vigour subscale ($M = 15.27$, $SD = 6.34$) as compared to females ($M = 11.23$, $SD = 4.97$).

Table 4.4 ***Summary of ANOVA Results for POMS and the Dependent Variable of Gender***

	F	*p*	*d*	*95% Confidence Intervals for Mean*	
				Lower Bound	*Upper Bound*
Tension Subscale	.030	.864	.065	-.678	.808
Depression Subscale	.104	.749	.121	-.622	.865
Anger Subscale	.949	.339	..366	-.383	1.115
Vigour Subscale	3.433	.075	.709	-.056	1.475
Fatigue Subscale	.024	.877	.057	-.686	.799
Confusion Subscale	1.386	.250	.450	-.302	1.202
Total Mood Disturbance	.371	.548	.231	-.514	.977

* $p < .05$

Variables Predicting Cardiac Rehabilitation Adherence

This study sought to determine which variables predicted cardiac rehabilitation adherence. Predictor variables included age, gender, marital status, employment status, education, family size, social support, internal locus of control, chance locus of control, powerful others locus of control, and intention to attend. To determine factors that predicted attendance at the cardiac rehabilitation program (operationalized as number of rehabilitation sessions attended) multiple regression and logistic regression models were analyzed. Using data from the 18 participants who attended all or some sessions, the number of rehabilitation sessions attended was regressed on all of the predisposing, enabling and need variables in one step (enter method). This regression model was chosen in order to replicate the data analysis of Johnson, Weinert and Richardson (1998) who utilized a forced entry regression method. Cohen's f^2 will be used as a measure of effect size for the multiple regression analysis. Effect sizes of .02, .15, and .35 are

considered small, medium, and large, respectively (Cohen, 1988). Medium effect sizes are expected.

The predisposing variable of internal locus of control was significant ($\beta = .552$, $p = .053$) and the predisposing variable of employment status was approaching significance ($\beta = -1.951$, $p = .070$) as can be seen in Table 4.5. The independent variables explained 53% of the variance within the number of rehabilitation sessions attended ($R^2 = .534$). Although moderate effect sizes were expected, the f^2 for the multiple regression is a large effect size ($f^2 = 1.15$).

Table 4.5 ***Summary of Multiple Regression Analysis for Variables Predicting the Number of Cardiac Rehabilitation Sessions Attended***

Variable	*B*	*SE B*	*B*	*p*	95% Confidence Interval for *B*	
Age	.300	.254	.364	.257	-.242	.841
Gender [a]	5.771	5.566	.282	.316	-6.093	17.635
Education	0.076	2.140	.009	.972	-4.486	4.637
Employment status	-7.149	3.664	-.580	.070	-14.959	.661
Marital status	-3.989	2.570	-.377	.141	-9.467	1.489
Number of children	1.144	1.914	.196	.559	-2.935	5.223
Plan on attending	3.276	3.728	.203	.393	-4.670	11.223
Social support	1.148	2.734	.099	.680	-4.680	6.976
Internal subscale	1.168	.556	.552	.053*	-.16	2.353
Chance subscale	-.817	.519	-.484	.136	-1.923	.289
Powerful others subscale	-.355	.464	-.230	.455	-1.344	.633
Emotional health	-.126	.129	-.310	.342	-4.01	.148

[a] *0* = female, 1 = male
*p < .05
$R^2 = .534$

A logistic regression model determined whether the predictor variables were associated with a greater likelihood of attendance at the cardiac rehabilitation program. Logistic regression was used in order to allow for the use of the total sample (N = 28). The dependent variable "rehab" was coded as 0 (those who did not attend the

rehabilitation program) and 1 (those who had attended at least 1 rehabilitation session). Results can be seen in Table 4.6. Because only those who participated in the cardiac rehabilitation program could answer the questions related to distance and travel time to the program, transportation difficulty and functional ability, those variables could not be used in the logistic regression analysis. The regression model was obtained by regressing rehab on age, gender, marital status, employment status, education, family size, social support, internal locus of control, chance locus of control, powerful others locus of control, intention to attend and emotional health. Effect sizes are measured using the odds ratio (Exp*B*) with small to moderate effect sizes expected.

Table 4.6 ***Summary of Logistic Regression Analysis for Variables Predicting Attending a Cardiac Rehabilitation Program***

	Wald	Df	*p*	Exp(*B*)	95% Confidence Interval for Exp(*B*)	
					Lower	Upper
Predisposing						
Age	.000	1	.994	4219.294	.000	.
Gender	.000	1	.990	.000	.000	.
Marital status	.000	1	.994	.000	.000	.
Employment status	.000	1	.994	.000	.000	.
Education	.000	1	.995	.000	.000	.
Family size	.000	1	.991	.000	.000	.
Social support	.000	1	.994	.000	.000	.
Internal locus of control	.000	1	.994	107068.97	.000	.
Chance locus of control	.000	1	.993	.000	.000	.
Powerful others locus of control	.000	1	.995	.000	.000	.
Intent to participate	.000	1	.989	.000	.000	.
Need						
Emotional health	.000	1	.999	.776	.000	.

The indication from the outcome of the logistic regression is that none of the predictor variables were associated with a greater likelihood of attendance at the cardiac rehabilitation program. The results suggest that the likelihood of individuals attending the rehabilitation program did not differ by age, gender, marital status, employment status, education, family size, social support, internal locus of control, chance locus of control, powerful others locus of control, intention to attend or emotional health.

Summary

This chapter presented the major research findings obtained from this study. The two research questions outlined in chapter one were answered through descriptive statistics, means, standard deviations, and frequencies for each demographic variable as well as descriptive statistics for the remaining predisposing, enabling and need factors. As well, the research questions were answered through correlations, ANOVA results, multiple and logistic regression analyses. Chapter five will discuss the study's research findings, recommendations for future research studies and a conclusion.

Figure 4.1 Age Distribution of Participants

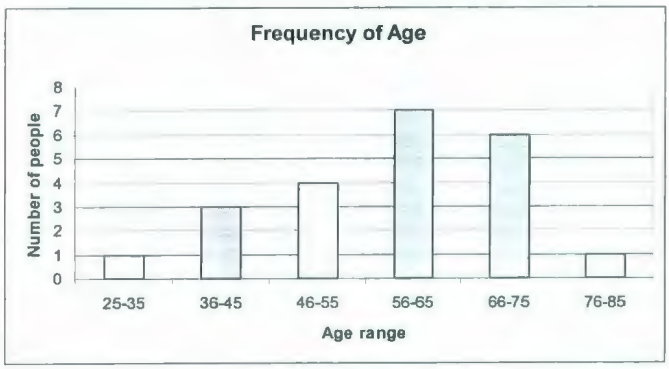


Figure 4.2 Age Distribution of Participants by Gender

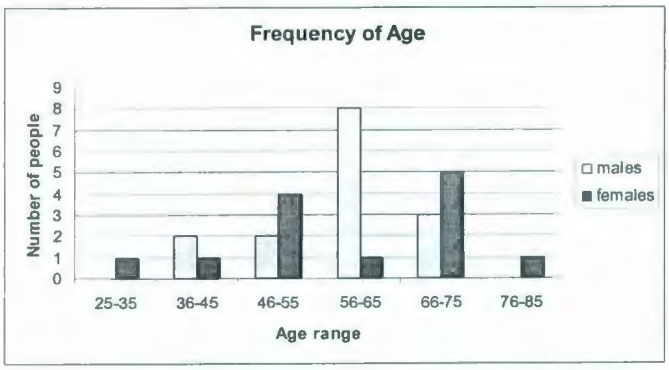


Figure 4.3 Percentage of Responses Indicating Intent to Attend Cardiac Rehabilitation

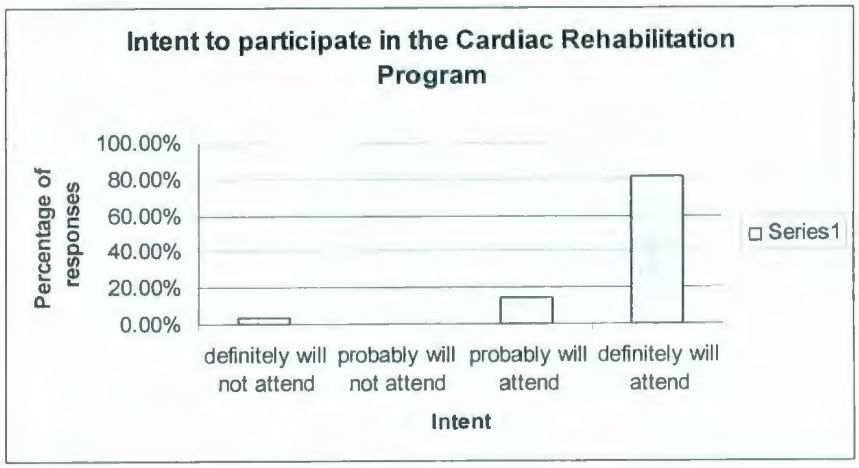


Figure 4.4 Intent to Attend by Gender

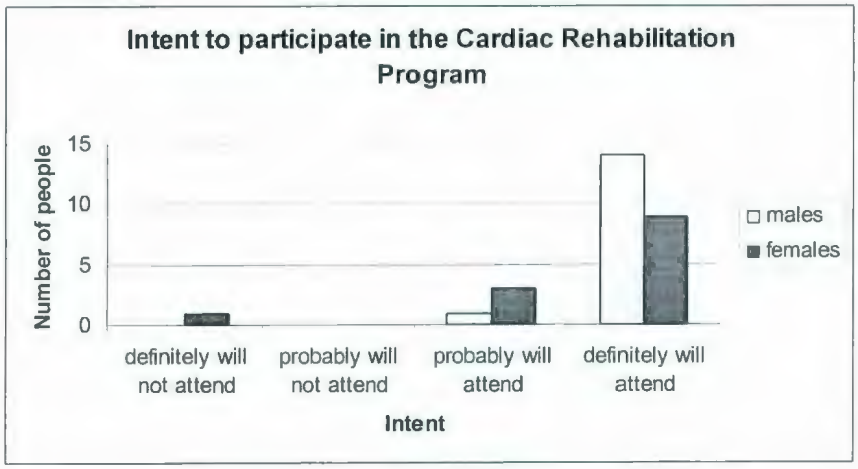


Figure 4.5 MOS Social Support Survey Subscale Means

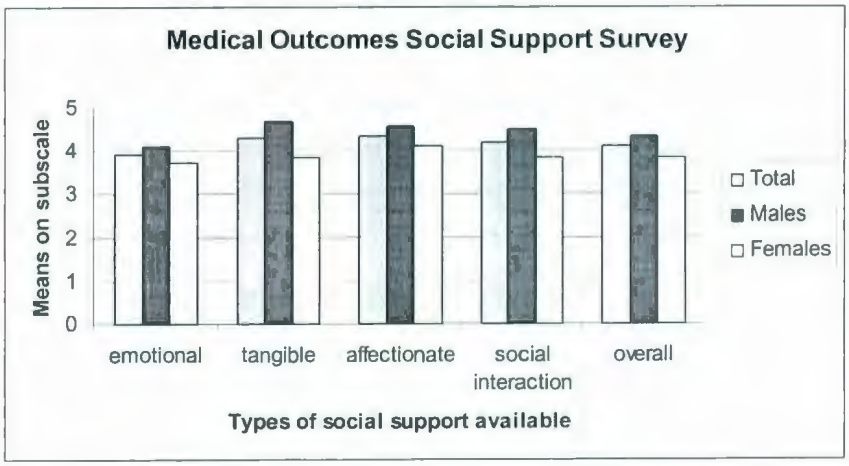


Figure 4.6 MHLC Subscale Means

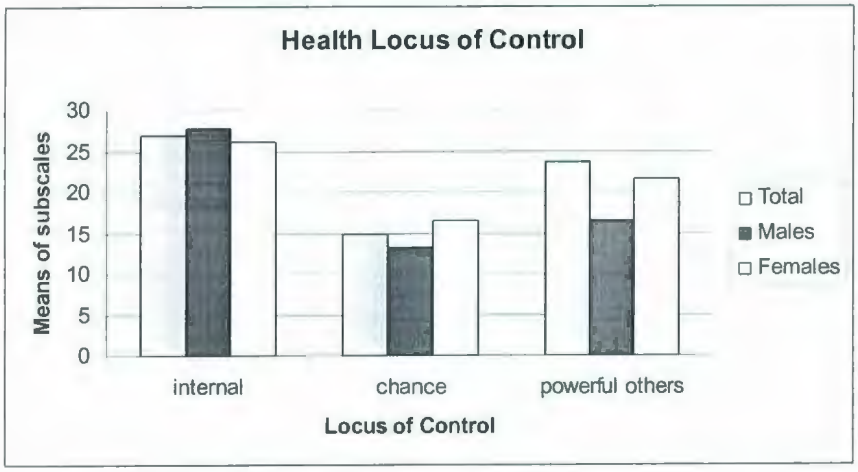


Figure 4.7 POMS Subscale Means

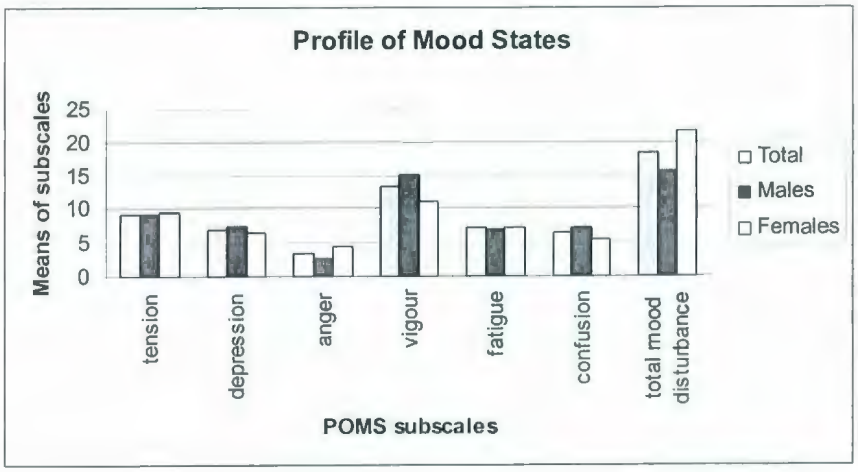
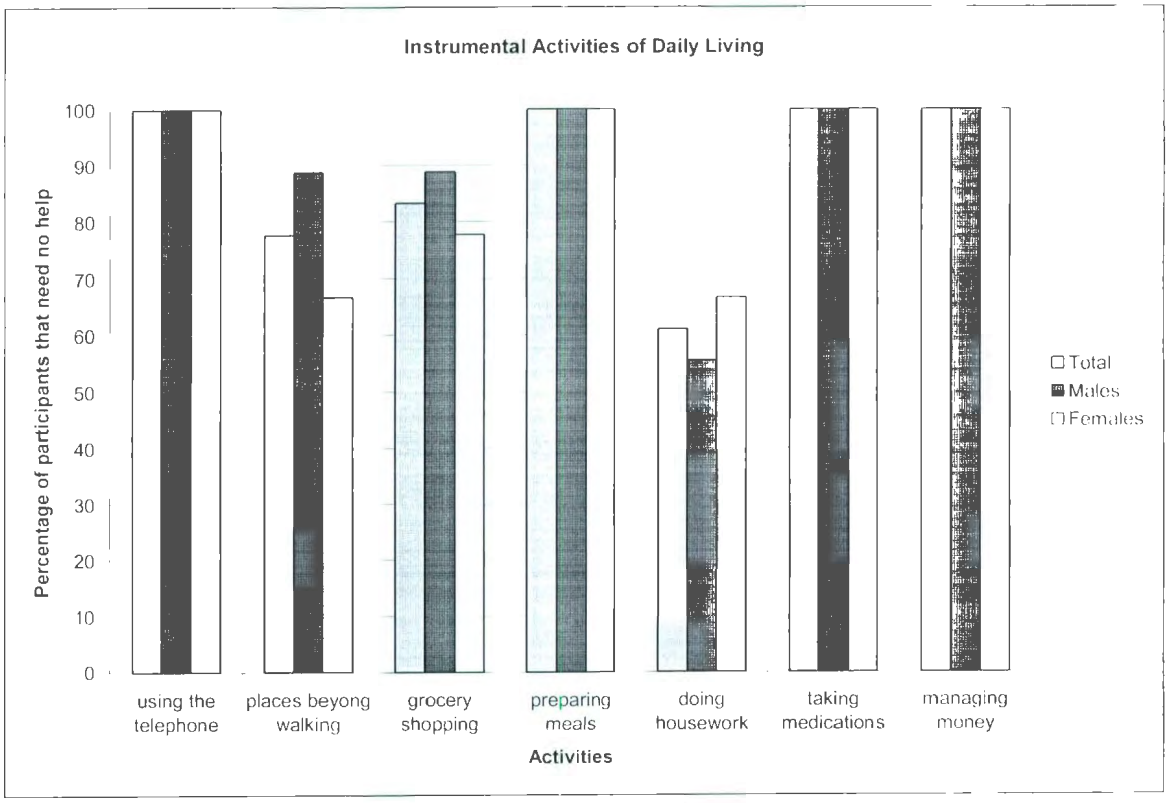


Figure 4.8 IADL Totals



CHAPTER 5: DISCUSSION

Overview

This study investigated factors that predict participation and adherence in a cardiac rehabilitation program in St. John's, Newfoundland. Research suggests that many barriers exist that deter people from participation in these beneficial cardiac rehabilitation programs such as age, gender, social support and accessibility (Beckie, 2006; Stone & Arthur, 2004; Witt et al., 2004, Fleury et al., 2004; Litt et al., 2002; Lee, 1993; Salis et al., 1992). Research has found adherence is a major problem in cardiac rehabilitation with attrition rates ranging up to 25% in the first three months and 30-60% in the first 6 months after starting the cardiac rehabilitation program (Bock et al., 1997; Oldridge, 1991; Oldridge & Streiner, 1990; Izawa et al., 2004; Radtke, 1989).

The preceding chapters presented an overview of factors predicting participants' utilization and adherence to cardiac rehabilitation as reviewed in the literature, described the purpose and methodology of the study and provided the statistical results of the study. This chapter will discuss findings with regards to identifying barriers participants faced in joining and adhering to cardiac rehabilitation as well as gender differences in cardiac rehabilitation utilization. Particular emphasis will be placed on answering the following research questions for the Healthcare Corporation of St. John's cardiac rehabilitation program: 1) What are the predisposing, enabling and need factors that cardiac rehabilitation program participants face?, 2) Do differences exist between the predisposing, enabling and need factors faced by male as compared to female cardiac rehabilitation program participants? and 3) What factors predict cardiac rehabilitation adherence?

One must interpret the results with caution as the sample size for this study was extremely small. As well, the short amount of time between initial contact and follow up of results , sample attrition and decline rates could have decreased the power of the results that may have been more meaningful with a larger sample size.

This chapter will begin by presenting a summary and explanation of the study's findings for each of the predisposing, enabling and need factors. It will be followed by limitations of the study, future research recommendations and a conclusion.

Barriers to Cardiac Rehabilitation

Predisposing Variables

Demographic Variables. Age, gender and race have been reported to be significant barriers to participation in cardiac rehabilitation (Beckie, 2006; Stone & Arthur, 2004; Witt et al., 2004). As well, socio-demographic factors such as being socially deprived, living further away from the program and not having access to public transport have been shown to predict attendance (Schulz & McBurney, 2000; Pell & Morrison, 1998).

None of the demographic variables in this study were found to be statistically significant in regards to participation in a cardiac rehabilitation program or number of sessions attended as determined by the multiple regression or the logistic regression analysis respectively. As suggested by the correlations in the data, having a higher education background approached significance with attendance at the cardiac rehabilitation program. As indicated in previous research, having a lower level of education is associated with non-attendance or dropout of exercise programs (Ades et al.,

1992a; Alter et al., 2004; Cooper et al., 1999; Daltroy, 1985; Dishman et al., 1985; Fleury et al., 2001; French et al., 2005; Harlan et al., 1995; Johnson et al., 1998; Lane et al., 2001; Pell et al., 1996; Ramm et al., 2001). As noted by other research studies, lower socioeconomic status as well as lower education levels could lead to non participation in exercise programs as these persons might have fewer resources available to them than persons from higher social strata (Clark, Patrick, Grembowski & Durham, 1995; Lachman & Weaver, 1998; Matthews, Stansfeld, & Power, 1999; Sacker, Bartley, Firth & Fitzpatrick, 2001). Also, people with less education are more likely to engage in unhealthy behaviours, leading to more risk factors for cardiovascular disease, and have less access to health care services leading to non-attendance of exercise programs (Fahey, Insel, Roth & Wong, 2007).

Unlike previous research (Ades et al., 1992b; Cooper et al., 2002; Evenson & Fleury, 2000; Fleury et al., 2004; Witt et al., 2004), this study didn't find any other demographic barrier such as age, employment status, marital status or number of children as significant barriers to participating in cardiac rehabilitation. This could be due to the fact that the sample size was small ($N = 28$) which limits the ability to detect statistically significant group differences. As well, the findings specific to age could be skewed as this study had a large age range of participants who attended at least some of the cardiac rehabilitation sessions, with the sample ($N = 28$) ranging in age from 25-80 years of age.

Social Support. Social support has been identified as a powerful aspect in determining participation and adherence to cardiac rehabilitation programs (Jones, Farell, Jamieson, & Dorsch, 2003; Litt, Kleppinger & Judge, 2002; Lee, 1993; Salis et al., 1992; Yates et al., 1994). Also, studies indicate that the patients' perception of how social

support is intended and the type of support received is important when examining adherence (Cohen & McKay, 1984; Collins & Feeney, 2000; Goldsmith, McDermott, & Alexandar, 2000).

The ANOVA revealed that the social interaction and tangible subscale averages on the MOS were significant in regards to gender. Males had higher averages than females on both the significant social interaction and tangible subscales. This may mean males felt they had more opportunities for social contact with others such as having a good time as well as more support for help with physical items such as being taken to the doctors. Males in this study rated having someone "most of the time" for these types of support as compared to females. Males scored higher than females on the tangible subscale which supports findings from other research (Caulin-Glauer et al., 2001; Young and Kahana, 1993; Kristofferzon, Lofmark & Carlsson, 2005) that reported women received less instrumental support compared to men. This could be due to the fact that the females are often regarded as the primary caregiver for most families and this role can lead to lack of time for friends and activities outside the home (Gottlieb, 1989; Nelson & Robinson, 1999; Stewart et al., 1994). Nelson and Stewart (1999) also argue that men typically have more time for leisure and participate in more leisure activities outside the home compared to women. It should be noted that, although not statistically significant compared to males, women did score lower on all four social support subscales as well as the overall index of support.

Previous research has shown that withdrawal and negative reactions by friends, after a patient suffers a myocardial infarction, has a detrimental effect on social routines for both genders. As well, after a patient suffers a heart incident, they could have less

energy and decreased involvement in social activities (Stewart, Davidson, Meade, Hirth & Makrides, 2000).

Health Locus of Control. Research has found that patients' perceived beliefs consistently act as a predictor of lifestyle change and adherence (Bock et al., 1997; Burns et al., 1998; Hellman, 1997; Litt et al., 2002). This study did not find any statistical significance on the MHLC with regards to gender. However, the correlation between the powerful others subscale on the MHLC and "plan on attending" did approach statistical significance ($p = .75$). Participants that scored high on the powerful others subscale felt other people were determining the events of their lives and they were planning to attend cardiac rehabilitation based on recommendations from other important people in their lives. An external locus of control can be debilitating to efforts to change behaviour or exercise adherence as the participant may only be attending in order to please others (Fahey et al., 2007). Physicians can be viewed as powerful others and research has suggested that proper recommendation from a physician to attend a cardiac rehabilitation increases attendance and adherence (Ades et al., 1992a; Bittner et al., 1997; Burns, et al., 1998; Johnson et al., 1998). Specifically, Ades et al (1992a) found that the stronger the recommendation from the physician, the greater the participation.

The correlation between employment status and the internal subscale on the MHLC also approached statistical significance ($p = .77$). Those participants that were employed scored higher on the internal subscale, meaning they felt more in control of their own behaviour and health status than did those who were unemployed. An internal locus of control is advantageous to adherence as it reinforces motivation and commitment (Fahey et al., 2007). As well, the internal locus of control subscale was statistically

significant while employment status approached significance when regressed on number of sessions attended (p .053 and p = .07, respectively).

Intent to Participate. Although 82 percent of the participants indicated that they would definitely attend the cardiac rehabilitation program, only 60.7 percent of the participants actually participated in at least one of the sessions. However, no statistically significant differences were found regarding intent to participate and any predisposing, enabling or need factor. As well, no statistically significant differences were found regarding intent to participate and whether the participant attended the program and the number of cardiac rehabilitation sessions attended. The only variable approaching statistical significance in regards to intent to participate was the powerful others subscale on the MHLC scale as previously discussed.

Research has shown that patients treated by a cardiologist are more likely to attend a cardiac rehabilitation program than those referred by a general physician (NHS Centre for Reviews and Dissemination, 1998). A predictor of referral is also the cardiologist's endorsement and attitude towards effectiveness of the cardiac rehabilitation program (Caulin-Glaser et al., 2001; Evenson et al., 1998; Halm et al., 1999). All patients who participated in this study were referred to the cardiac rehabilitation program by the same cardiologist. Cardiologists may be more aware of the correct referral procedures and may be more likely to influence the patients' decision as they are a specialist in their field.

Enabling Variables

Transportation and Accessibility. Research has indicated that non-attenders are more likely to be socially deprived, older, living further away from the program, living

alone and not having access to public transport (Schulz & McBurney, 2000; Pell & Morrison, 1998). This study did not find any significance in regards to transportation or accessibility to the cardiac rehabilitation program. The only variable slightly approaching significance with attending any rehabilitation sessions was number of kilometers traveled to the program ($p = .76$). Interestingly, the majority of the sample (85.7%) lived within ten kilometers or less away from the referral outpatient clinic. As well, since the outpatient clinic is less than three kilometers away from the cardiac rehabilitation program, one can generally state that participants in the program lived within 15 kilometers or less or the cardiac rehabilitation program. Of all the patients originally referred to the outpatient clinic or who began attending the cardiac rehabilitation program, it would seem only those who lived within 15 kilometres or less actually attended either the clinic alone or the clinic and the cardiac rehabilitation program. Many people may not have even attended the outpatient clinic in order to be referred to the cardiac rehabilitation program. This finding supports research by Ades et al. (1992a) who found commuting time was predictive of participation in cardiac rehabilitation and that participants were more likely to live closer to the facility than non-participants. As previous research has found, factors such as program distance and availability of transportation and accessibility of the facility influence participation in cardiac rehabilitation or exercise programs (Ades et al., 1995; Humpel, Owen, Leslie, 2002; Moore, 1996; Moore, Ruland, Pashkow & Blackburn, 1998; Owen, Leslie, Salmon & Fotheringham, 2000; Tod, Lacey & McNeill, 2002).

Need Variables

Emotional Health. Research suggests that depression, anxiety and negative emotional health lead to reduced adherence to treatment in cardiac patients (Carney, Freedland, Eisen, Rich, & Jaffe, 1995; Stone & Arthur, 2005). The current research did not find any significant differences for the total mood disturbance in regards to attendance and adherence to the cardiac rehabilitation program. This study did find the vigour subscale on the POMS approached significance in regards to gender. Males scored higher than females on the vigour subscale. This may be interpreted as more males than females felt they had more energy and strength in their lives in order to accomplish daily activities. Vigour can be related to motivation and may help one adhere to an exercise program, although, inconsistent reports are found in the literature regarding the influence of mood states and motivation on exercise maintenance (Evenson & Fleury, 2000; Jette et al., 1998). As well, although depression wasn't found to be significant in regards to attendance or adherence, it is noted that some participants scored higher on the depression subscale than on any other subscale. There may be a need for the mental health of patients to be assessed after a cardiac incident and the patient to be directed to appropriate services. Research has found that exercise training and participation in cardiac rehabilitation reduces depression (Blumenthal et al., 2005; Milani, Lavie, & Cassidy, 1996; Lavie, Milani, Cassidy & Gilliland, 1999).

Illness Severity. The current investigation found that only half the sample rated their current cardiac condition as moderately serious or very serious (53%). As well, more men than women felt their current condition was very serious. It is possible the sample in the current research felt their condition had improved enough for them to be

able to increase their physical activity levels and participate in the cardiac rehabilitation program. Those patients who rated their current cardiac condition as very serious may not participate in cardiac rehabilitation due to safety concerns or beliefs about their illness. Previous studies have shown that patient's' illness beliefs influence attendance at cardiac rehabilitation (Cooper, Jackson, Weinman & Horne, 2003; Horne & Weinman, 2002)

Functional Ability. Burns et al. (1998) found that individuals with poor functional capacity were less likely to adhere to cardiac rehabilitation. Harlan et al. (1995) found that patients with a lower degree of functional capacity were less likely to enroll in cardiac rehabilitation. Although, it is noted that physicians are less likely to refer patients with severe impairment following a cardiac event (Burns et al., 1998; Daly et al., 2002). That means most individuals that participate in a cardiac rehabilitation program would have a relatively high rate of functional ability before being discharged from the hospital and being referred to outpatient cardiac rehabilitation. The current research supports this findings as most participants in the study (90%) were relatively independent, scoring at least twelve or more of a total of fourteen on the IADL scale at the cardiac rehabilitation sessions. As well, functional ability was significantly correlated with intent to participate ($p < .01$).

Limitations

There are several limitations associated with this study. The sample was a convenience sample of very small proportions ($N = 28$) and as a result the multivariate analysis has to be interpreted with caution. As well, the assumption of homogeneity of

variance was tested using Levene's statistic and the tangible subscale on the MOS and the fatigue subscale on the POMS both didn't meet this requirement. The following dependent variables were also not normally distributed according to Kolmogorov-Smirnov test: emotional, tangible, affectionate and social interaction subscales along with overall index of support on the MOS, depression, anger and fatigue subscales on the POMS.

Statistical analysis procedures utilized in the present study followed those of Johnson, Weinert and Richardson (1998) since this study modeled and cross-validated their study. More appropriate statistical models, such as a utilizing a hierarchical regression model rather than forced entry model, could have been used in order to decrease multicollinearity and increase power with a small sample size.

The low sample size in this study could be attributed to a few reasons. The participants in this study were recruited shortly before the start of rehabilitation, at the outpatient clinic, which may affect participation rate in the cardiac rehabilitation program. The point of initial recruitment warrants closer attention as those who were just diagnosed or have been out of the hospital awhile may not attend the outpatient clinic, limiting the sample of potential participants. The study was also conducted over the winter months which could have attributed to adherence of the participants to the program. Family obligations, holiday vacations, transportation and weather conditions may have played a role in whether people participated in the cardiac rehabilitation program over this time period. As well, studies designed to predict factors associated with participation or adherence to cardiac rehabilitation should be longitudinal in nature (Daly et al., 2002).

The study design and use of self-administered questionnaires may have limited the number of potential participants. Some people did not participate as they were illiterate and/or had visual limitations. As well, participants were not available to take part in the study until they had attended the outpatient clinic for referral. Patients may have had various amounts of waiting time from the time of their surgery until the appointment for the outpatient clinic. Additionally, after the outpatient clinic many patients had to wait for a mandatory stress test appointment before starting the cardiac rehabilitation program. The waiting times for both the referral appointment and the stress test appointment may have impacted the length of time between when they started the cardiac rehabilitation program and their cardiovascular incident. Participants ranged from recently having a heart incident to having had a heart incident months before attending the outpatient clinic. Some participants may have answered questions differently had their heart incident occurred more recently.

The findings of this study can not be generalized to a broader population as the study participants were only drawn from one group at one cardiac rehabilitation site in St. John's, Newfoundland. It is not known to what extent these results are representative of the entire cardiac rehabilitation population across the province, much less across the country. As well, the selection of participants was not randomized. The subjects volunteered to participate in the study, as well as the cardiac rehabilitation program, and were not compared with a control group matched for variables such as gender and age.

Future Research

In light of these findings, future research is proposed in order to further knowledge and bring forth new ideas on understanding barriers to cardiac rehabilitation utilization and adherence. A further study which includes a longitudinal intervention based, randomized controlled trial may be beneficial in order to record changes over time and allow for controlling alternative explanations and determining cause and effect relationships. As well, a multisite study is needed to examine the effectiveness of interventions to enable results to be generalized to the population. Also, a qualitative one-on-one structured interview may provide insight about barriers to participation based on a more personal level. More research is needed to not only examine the participants who inconsistently attended or dropped out of the program, but also those who were never referred or chose not to enroll in the program in the first place (Daly et al., 2002). Future research should also focus on exploring environmental barriers in more depth such as weather and travel time. More research is also needed on rural cardiac rehabilitation participants in order to include the whole cardiac population. Future research should examine ways to minimize barriers to participation and ways to increase adherence to cardiac rehabilitation programs in order for a more healthy population.

Conclusion

Cardiovascular disease was the single greatest cause of death in Canada in 2001, accounting for one in three deaths (Health Canada, 2005). Cardiac rehabilitation programs have been designed in order to minimize the effects of cardiovascular disease while reducing morbidity and mortality. Although there are many benefits of cardiac

rehabilitation programs, many barriers exist that deter patients from participation or adhering to these programs.

This research study identified the barriers that affect the usage and adherence to participation at a cardiac rehabilitation program in St. John's, Newfoundland. Understanding barriers and reasons for non-adherence as well as gender differences to these barriers is essential to develop strategies to enhance future cardiac rehabilitation programs. Having knowledge of the existing participation barriers in a population can lead to designing interventions to maximize participation by patients who need rehabilitation. The findings of the present study identified that barriers to participation as well as gender differences do exist in this small sample of cardiac rehabilitation patients. Further research is required to understand how predisposing, enabling and need factors influence participation and adherence to the programs.

Future research studies should explore the longitudinal effects of an intervention based program which focuses on psychological as well as physical well-being. Future studies should also focus on ways to improve group cohesion in order to increase the number of participants into this valuable rehabilitation program and improve rates of adherence for more beneficial outcomes.

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Appendix A

Ethics Approval

Memorial
University of Newfoundland

Office of Research

August 4, 2006

ICEHR No. 2005/06-113-HK

Ms. Blayre Martin
School of Human Kinetics and Recreation
Memorial University of Newfoundland

Dear Ms. Martin,

Thank you for your submission to the Interdisciplinary Committee on Ethics in Human Research (ICEHR) entitled "*Factors influencing participant's use of cardiac rehabilitation programs*". The ICEHR is appreciative of the efforts of researchers in attending to ethics in research.

The Committee has reviewed the proposal and we agree that the proposed project is consistent with the guidelines of the Tri-Council Policy Statement (TCPS). Full approval is granted for one year from the date of this letter.

If you intend to make changes during the course of the project which may give rise to ethical concerns, please forward a description of these changes to ICEHR for consideration.

If you have any questions concerning this review you may contact Dr. Katherine Gallagher at kgallagh@mun.ca. We wish you success with your research.

The TCPS requires that you submit an annual status report to ICEHR on your project, should the research carry on beyond August 2007. Also, to comply with the TCPS, please notify ICEHR upon completion of your project.

Yours sincerely,

K. Gallagher, Ph.D.
Vice-Chair, Interdisciplinary Committee on Ethics in Human Research

KG/emb

cc Supervisor

Appendix B

Information letter for participants

Date

Dear participant,

You have been invited to participate in a study designed to investigate reasons why people participate in cardiac rehabilitation programs. This study is being conducted by Blayre Martin, a graduate student in the School of Human Kinetics and Recreation at Memorial University of Newfoundland. In order to cope with and reduce the impact of cardiovascular disease, cardiac rehabilitation programs have been designed and implemented to prevent further progression of the disease while increasing wellness and the quality of life of individuals. The present study concerns itself with exploring the reasons why people may or may not participate in cardiac rehabilitation programs. Learning more about any reason that may influence people's participation in cardiac rehabilitation may lead to better programs that address the needs of patients.

If you agree to participate in this study, you will be asked to fill out questionnaires at two points 1) at the outpatient clinic, b) two months after starting the cardiac rehabilitation program. The questionnaires will require you to answer questions such as demographics, health, accessibility to the program and social support.

All information from this study will remain confidential. No names will appear in any reporting of the study. You are free to withdraw from this study at anytime without consequences. Any data collected for the study will be kept in possession by the researcher for a five year period as required by Memorial University then subsequently destroyed.

The proposal for this research has been approved by the Interdisciplinary Committee on Ethics in Human Research at Memorial University. If you have ethical concerns about the research, you may contact the Chairperson of the ICEHR at icehr@mun.ca or by telephone at 737-8368. If you have any questions about this study, please feel free to contact the supervisor of this study, Dr. Basil Kavanagh at basilk@mun.ca.

If you agree to participate in this study, please fill out the information at the bottom of this sheet.

Sincerely,
Blayre Martin

STUDY CONSENT

Signing this form gives your consent to take part in this study. It says you have understood the nature of the study and you have received satisfactory answers to your questions. You are acknowledging that you are free to withdraw from the study without having to give a reason.

Signature: _____ Date: _____

ADDITIONAL CONSENT

I agree to allow the researcher to contact me if I should drop out of the cardiac rehabilitation program before the final date of the program.

Signature: _____ Date: _____

Appendix C

Questionnaire Packet 1

Questionnaire Packet 1

Name:_____
Address:_____
_____
Gender:_____
Age: _____
Highest level of education completed:_____
Employment Status:_____
Marital Status: _____
Number of children:_____

1. Do you plan on attending the cardiac rehabilitation program: (please circle the corresponding number)

1	2	3	4
I definitely will not plan to attend	I may attend	I probably will attend	I definitely

2. If you answered definitely will not, please explain your reasoning

_____
_____

3. Please circle what you would rate your current health as:

1	2	3	4
Poor	Fair	Good	Excellent

4. How often is each kind of support available to you if you need it? Circle one number on each line.

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Someone you can count on to listen to you when you need to talk	1	2	3	4	5
Someone to give you information to help you understand a situation	1	2	3	4	5
Someone to give you good advice about a crisis	1	2	3	4	5
Someone to confide in or talk to about yourself or your problems	1	2	3	4	5
Someone whose advice you really want	1	2	3	4	5
Someone to share your most private worries and fears with	1	2	3	4	5
Someone to turn to for suggestions about how to deal with a personal problem	1	2	3	4	5
Someone who understands your problems	1	2	3	4	5
Someone to help you if you were confined to bed	1	2	3	4	5
Someone to take you to the doctor if you needed it	1	2	3	4	5
Someone to prepare your meals if you were unable to do it yourself	1	2	3	4	5
Someone to help with daily chores if you were sick	1	2	3	4	5
Someone who shows you love and affection	1	2	3	4	5
Someone to love and make you feel wanted	1	2	3	4	5
Someone who hugs you	1	2	3	4	5
Someone to have a good time with	1	2	3	4	5
Someone to get together with for relaxation	1	2	3	4	5
Someone to do something enjoyable with	1	2	3	4	5
Someone to do things with to help you get your mind off things	1	2	3	4	5

5. Each item below is a belief statement about your medical condition with which you may agree or disagree. Beside each statement is a scale which ranges from (1) strongly disagree to (6) strongly agree. For each item please circle ONE number that represents the extent to which you agree or disagree with that statement.

1=STRONGLY DISAGREE (SD)
2=MODERATELY DISAGREE (MD)
3=SLIGHTLY DISAGREE (D)
4=SLIGHTLY AGREE (A)
5=MODERATELY AGREE (MA)
6=STRONGLY AGREE (SA)

		SD	MD	D	A	MA	SA
1	If I get sick, it is my own behaviour which determines how soon I get well again.	1	2	3	4	5	6
2	No matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5	6
3	Having regular contact with my physician is the best way for me to avoid illness.	1	2	3	4	5	6
4	Most things that affect my health happen to me by accident.	1	2	3	4	5	6
5	Whenever I don't feel well, I should consult a medically trained professional.	1	2	3	4	5	6
6	I am in control of my health.	1	2	3	4	5	6
7	My family has a lot to do with my becoming sick or staying healthy.	1	2	3	4	5	6
8	When I get sick, I am to blame.	1	2	3	4	5	6
9	Luck plays a big part in determining how soon I will recover from an illness.	1	2	3	4	5	6
10	Health professionals control my health.	1	2	3	4	5	6
11	My good health is largely a matter of good fortune.	1	2	3	4	5	6
12	The main thing which affects my health is what I myself do.	1	2	3	4	5	6
13	If I take care of myself, I can avoid illness.	1	2	3	4	5	6
14	Whenever I recover from an illness, it's usually because other people (eg. Nurses, doctors, family) have been taking good care of me.	1	2	3	4	5	6
15	No matter what I do, I'm likely to get sick.	1	2	3	4	5	6
16	If it's meant to be, I will stay healthy.	1	2	3	4	5	6
17	If I take the right actions, I can stay healthy.	1	2	3	4	5	6
18	Regarding my health, I can only do what my doctor tells me to do.	1	2	3	4	5	6

6. Describe HOW YOU FEEL RIGHT NOW by circling one number after each of the words listed below:

FEELING	*Not at all*	*A little*	*Moderately*	*Quite a bit*	*Extremely*
Friendly	1	2	3	4	5
Tense	1	2	3	4	5
Angry	1	2	3	4	5
Worn out	1	2	3	4	5
Unhappy	1	2	3	4	5
Clear-headed	1	2	3	4	5
Lively	1	2	3	4	5
Confused	1	2	3	4	5
Sorry for things done	1	2	3	4	5
Shaky	1	2	3	4	5
Listless	1	2	3	4	5
Peeved	1	2	3	4	5
Considerate	1	2	3	4	5
Sad	1	2	3	4	5
Active	1	2	3	4	5
On edge	1	2	3	4	5
Grouchy	1	2	3	4	5
Blue	1	2	3	4	5
Energetic	1	2	3	4	5
Panicky	1	2	3	4	5
Hopeless	1	2	3	4	5
Relaxed	1	2	3	4	5
Unworthy	1	2	3	4	5
Spiteful	1	2	3	4	5
Sympathetic	1	2	3	4	5
Uneasy	1	2	3	4	5
Restless	1	2	3	4	5
Unable to concentrate	1	2	3	4	5
Fatigued	1	2	3	4	5
Helpful	1	2	3	4	5
Annoyed	1	2	3	4	5
Discouraged	1	2	3	4	5

FEELING	*Not at all*	*A little*	*Moderately*	*Quite a bit*	*Extremely*
Resentful	1	2	3	4	5
Nervous	1	2	3	4	5
Lonely	1	2	3	4	5
Miserable	1	2	3	4	5
Muddled	1	2	3	4	5
Cheerful	1	2	3	4	5
Bitter	1	2	3	4	5
Exhausted	1	2	3	4	5
Anxious	1	2	3	4	5
Ready to fight	1	2	3	4	5
Good-natured	1	2	3	4	5
Gloomy	1	2	3	4	5
Desperate	1	2	3	4	5
Sluggish	1	2	3	4	5
Rebellious	1	2	3	4	5
Helpless	1	2	3	4	5
Weary	1	2	3	4	5
Bewildered	1	2	3	4	5
Alert	1	2	3	4	5
Deceived	1	2	3	4	5
Furious	1	2	3	4	5
Effacious	1	2	3	4	5
Trusting	1	2	3	4	5
Full of pep	1	2	3	4	5
Bad-tempered	1	2	3	4	5
Worthless	1	2	3	4	5
Forgetful	1	2	3	4	5
Carefree	1	2	3	4	5
Terrified	1	2	3	4	5
Guilty	1	2	3	4	5
Vigorous	1	2	3	4	5
Uncertain about things	1	2	3	4	5
Bushed	1	2	3	4	5

7. How far must you travel for EMERGENCY medical care? In answering this question think about a potential emergency such as a heart attack. How far (ONE WAY) must you travel to get assistance? Please try to be as accurate as possible when recording the distance.

_____Number of Kilometres (one way)
_____Approximate travel time (One way)

8. Please describe your source of emergency care (For example: nurse, hospital, physician's office, etc.)

_____

9. I would describe myself as living: (please CHECK only ONE response)

A. On a farm/ranch ___

B. In a rural area (not a farm/ranch) ___

C. In a small rural town ___

D. In a small town ___

E. In a medium size city ___

F. In a large city ___

Appendix D

Questionnaire Packet 2

Name: _____

Questionnaire Packet 2

1. How serious is your current cardiac condition? (Please CIRCLE one)

1	2	3	4
Not serious	Slightly serious	Moderately serious	Very serious

2. How much has your cardiac incident affected your lifestyle? (Please CIRCLE one)

It has had a very negative effect	1
It has had a negative effect	2
It has had no effect	3
It has had a positive effect	4
It has had a very positive effect	5

3. What influenced you to stay in the cardiac rehabilitation program?

_____

_____

4. How difficult is it to find transportation to a cardiac rehabilitation program?

1	2	3	4
Not at all difficult	Slightly difficult	Moderately difficult	Very difficult

5. How convenient is traveling to the cardiac rehabilitation program?

_____

6. How risky is the travel conditions to the program? _____

7. How many kilometers from home is the cardiac rehabilitation program?

_____

8. How many minutes does it take you to travel to the program?

_____

9. Please place a check on the line that most applies for each activity:

Activity	Need No Help	Need Some Help	Unable to Do at All
1. Using the Telephone			
2. Getting to Places Beyond Walking Distance			
3.Grocery Shopping			
4. Preparing Meals			
5. Doing Housework or Handyman Work			
6. Taking Medications			
7. Managing Money			