Predictors for Participation in a Cardiac Rehabilitation Program Feasibility Study

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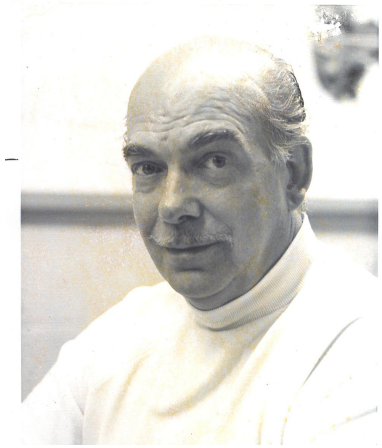
Dedication



First of all, this dissertation is dedicated to my mother Louise E. Krisko, RN who was my mentor during the years I was working towards my baccalaureate degree, my inspiration for studying heart disease (especially women) since she suffered and died from heart disease, and was my role model for nursing. My mother always put the patient first whether in the clinical area or the neighborhood. She was a labor room nurse for many years and baptized many little souls that either entered the world too soon or died shortly after birth. She was there for the bereaved mothers by advocating on their behalf. As an infection control nurse, she was the first president for the Minnesota chapter of the Association for Practitioners in Infection Control (APIC) and has an education fund in her name. Secondly, this dissertation is dedicated to my father Benedict W. Krisko, Sr. who always told me from as early as I can remember that I could do anything and that being a girl could not stand in my way. He valued education very highly because he was unable to finish high school in the 1930's. I only wish he could have lived long enough to see me accomplish this goal. I know he would have been so proud.

Abstract

OBJECTIVE: Feasibility study, to explore whether stage of readiness, level of self-efficacy, or perceived benefits/barriers to begin a cardiac rehabilitation (CR) program post cardiac event are associated with the length of time individuals will participate in a Phase II CR program.

BACKGROUND: “Stages of Behavior Change” from the Transtheoretical Model (TTM) of Health Behavior. Self-efficacy is one of the constructs of the TTM. Perceived benefits and barriers apply to an individual’s belief system regarding a needed course of action.

AIMS: To generate an effect size for: (1) possible association between stage of readiness; (2) level of self-efficacy; and (3) perceived benefits or barriers related to CR post cardiac event and their possible association with meeting CR goals and/or length of time in the program.

DESIGN AND METHOD: Prospective correlational design using a convenience sample of men and women having experienced a cardiac event who have received a physician’s order to attend a Phase II CR program.

PROCEDURE: The sample was taken from one CR center located in one tertiary care center. Data were collected over a two-month period of time.

FINDINGS: A significant association was found between the level of self-efficacy to begin CR and the percentage of CR goals met and a moderate association noted between the level of self-efficacy to begin CR and length of time in the program.

CONCLUSIONS: The higher the self-efficacy, the more likely individuals were to remain in CR. Other variables discovered to be of interest were perceived health before the cardiac event, perceived health "now," and perceived health in six months time. IMPLICATIONS: Accurate nursing assessments could help change adverse outcomes by identifying those at risk of not completing CR. Interventions by the nurse through encouragement (to help raise level of self-efficacy of the individual and through family teaching) could help improve completion outcomes.

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Chapter I

Introduction

Overview of Heart Disease and Cardiac Rehabilitation

Heart disease is the number one killer of women and men in the United States today (American Heart Association, 2006; WomenHeart, 2007). The development of heart disease depends in part on the influences of certain risk factors such as inactivity, obesity, hypertension, smoking, and poor diet (American Heart Association). Once heart disease has developed and has subsequently been treated, cardiac rehabilitation can become a secondary prevention strategy.

Cardiac rehabilitation "refers to coordinated, multifaceted interventions designed to optimize a cardiac patient's physical, psychological, and social functioning, in addition to stabilizing, slowing, or even reversing the progression of the underlying atherosclerotic processes, thereby reducing morbidity and mortality" (Leon, Franklin, Costa, Balady, Berra et al., 2005, p. 369). Cardiac rehabilitation is a medically supervised and physician directed interventional exercise program that follows the guideline of the American Heart Association (Leon et al.). Its effects on the cardiac patient's physical fitness include: (1) a reported increase in their peak oxygen uptake by 11% to 36% especially in individuals that are physically de-conditioned; (2) enhancing the patient's overall quality of life which can help even the elderly to live more independent lives; (3) counseling in the form of educational/vocational components that can assist the pre-retirement aged individual to return to the workforce; (4) decreasing cardiac mortality rates compared to having just the usual medical care post-surgery; (5) obtaining moderate losses in body weight, decreasing serum triglycerides, increasing high-density lipoprotein cholesterol,

and improving insulin sensitivity and glucose homeostasis thus reducing the risk of type 2 diabetes mellitus in those having glucose intolerance; (6) increasing endurance thereby creating a potential anti-ischemic effect on the myocardium; (7) reducing the risk of a coronary artery thrombotic occlusion occurring after a susceptible plaque has been disrupted through hemostatic changes as a result of exercise training; (8) improving the psychological well-being of the individual (Leon et al.); and (9) obtaining significant reductions in systolic blood pressure (Taylor et al., 2004).

Phase I of the cardiac rehabilitation program begins while the individual is post event and still in the hospital. The Phase II portion of cardiac rehabilitation begins approximately one to two weeks after discharge from the hospital and is conducted on an outpatient basis. Specific rehabilitation goals for the individual to attain are determined by the cardiac rehabilitation staff. Most Phase II cardiac rehabilitation goals can be completed within six to eight weeks.

Statement of the Problem

The benefits of cardiac rehabilitation overall are well-known. However, there are still a substantial number of men and especially women who do not attend and adhere to a post-cardiac event exercise program (Halm, Penque, Doll, & Beahrs, 1999; Cox, Gorely, Puddey, Burke, & Beilin, 2003; Gallagher, McKinley & Dracup, 2003; Moore, Dolansky, Ruland, Pashkow & Blackburn, 2003; Clark, Barbour, White & MacIntyre, 2004; Fleury, Lee, Matteson & Belyea, 2004; Grace, Evindar, Kung, Scholey & Stewart, 2004a; Grace, Evindar, Kung, Scholey & Stewart, 2004b; Jackson, Leclerc, Erskine & Linden, 2005).

The strongest predictors identified in the literature for beginning a cardiac rehabilitation program are a physician's endorsement (Ruland & Moore, 2000; Bongard

et al., 2003; Gallagher et al., 2003; Grace et al., 2004b; Jackson et al., 2005), having had coronary artery bypass graft (CABG) surgery (Gallagher et al.), having received information about the benefits of cardiac rehabilitation (Allen, Scott, Stewart, & Rohm, 2004), and having an understanding of the seriousness of one's heart disease (Grace et al., 2004a).

The most common reasons given for not adhering to or completing a cardiac rehabilitation program are (1) traveling a long distance to the cardiac rehabilitation program (Jackson et al., 2005); (2) lack of health insurance coverage (Halm et al., 1999); (3) transportation issues (Halm et al.; Gallagher et al., 2003); (4) having exercise equipment at home (Halm et al.); (5) the presence of co-morbidities such as arthritis (Halm et al.; Moore et al., 2003; Jackson et al.); (6) being too busy with family commitments and caregiver responsibilities or just a general lack of time (Fleury et al., 2004; Jackson et al.); (7) inconsistent messages given by health care professionals regarding post-cardiac procedural care (Clark et al., 2004); (8) lack of belief in the benefits of cardiac rehabilitation (Clark et al.); and (9) having had a myocardial infarction (MI) diagnosis, since these patients do not see or experience the visible reminders that a post-surgical patient would see such as a sternal incision or post-operative symptoms and, as a result, are just not motivated to stay in the program (Gallagher et al.).

Aside from the more functional issues cited such as transportation and lack of health insurance coverage, which can be remedied by help from appropriate resources, other issues having to do with lack of motivation, lack of belief in the benefits of cardiac rehabilitation, and feeling too busy need to be addressed in an effort to improve cardiac rehabilitation adherence. Several studies have suggested that issues related to the

constructs of the Transtheoretical Model (TTM) such as self-efficacy (Allison & Keller, 2000; Resnick & Jenkins, 2000; Brassington, Atienza, Perczek, DiLorenzo & King, 2002; Rodgers, Hall, Blanchard, McAuley & Munroe, 2002; Beswick et al., 2005; Wilcox, Sharpe, Hutto & Granner, 2005; Woodgate & Brawley, 2008), social support (Allison & Keller; Brassington et al.; Beswick et al.; Husak et al., 2004), decisional balance (Boudreaux, Wood, Mehan, Scarinci, Taylor & Brantley, 2003; McAuley et al., 2006), and stage of readiness to begin an exercise program (Allison & Keller; Boudreaux et al., 2003; McAuley et al.) could account for some of the factors influencing cardiac rehabilitation outcomes.

As a result of the knowledge attained through prior studies, the TTM and its constructs as well as the assessment of perceived benefits and barriers to exercise could be instrumental in identifying those post-cardiac event patients at risk of dropping out of a Phase II cardiac rehabilitation program. By being able to predict high-risk individuals, perhaps appropriate interventions could be applied in an effort to improve completion outcomes.

Purpose of the study

The purpose of this pilot study was twofold; first, to assess post-cardiac event patients prior to entering a cardiac rehabilitation program by measuring the principles of the TTM along with its constructs. Secondly, by doing so, the longer term objective was to determine if perceived benefits or barriers could identify those at highest risk of not completing the Phase II portion of the rehabilitation program. By conducting a pilot study, the feasibility of a larger study could be determined including the utility of the chosen instruments to help guide future studies. Results of a larger, second study could

determine if the relative effectiveness of different strategies should be employed to help improve participation and hence cardiac rehabilitation outcomes.

Chapter II

Review of the Literature

Overview of Behavioral Influences

There are several factors that could influence an individual's decision about whether to remain in a prescribed cardiac rehabilitation program or not. In this chapter, some of these factors will be examined that are based on developed theories including the Transtheoretical Model (TTM) and its constructs as well as perceived benefits and barriers to exercise.

Stages of Change (Transtheoretical Model)

The stages of behavior change have originated from the Transtheoretical Model (TTM) of Health Behavior developed by Prochaska and DiClemente (Prochaska, Redding, & Evers, 1997). The TTM uses stages of change to combine the many different processes and principles of change from other known theories that are applied thus resulting in the name *trans*theoretical (Prochaska, Redding, & Evers, 2002). The original intent of the model was to systematically integrate the more than 300 theories of psychotherapy that existed. For example, one of the constructs of the TTM is consciousness-raising which comes from the Freudian tradition. In addition, other theories such as contingency management derived from the Skinnerian tradition and helping relationships which stem from the Rogerian tradition have contributed to the structure of the TTM. All of these constructs typify people in different stages of change. When first tested, the research focused on subjects struggling with quitting smoking (Prochaska et al.).

The TTM states that there are five stages of behavior change:

(1) Precontemplation; (2) Contemplation; (3) Preparation; (4) Action; and (5) Maintenance (Prochaska, Norcross, & DiClemente, 1994). Because the first three stages occur before action, they are known as the pre-action states (Laforge, Velicer, Richmond, & Owen, 1999). No action takes place in these stages since the first three stages contain individuals in a state of *being* rather than *doing*.

According to the literature, people are in different stages of change and will not all benefit from specific healthcare information in the same way (Andersen & Keller, 2002; Arora, Ayanian, & Guadagnoli, 2005; Gulliver & Horwath, 2001; Laforge, Velicer, Richmond, & Owen, 1999; Nigg et al., 1999; Prochaska, 1994; Ronda, Van Assema, & Brug, 2001; Share, McCrady, & Epstein, 2003). For instance, individuals who have undergone heart surgery or a cardiac catheterization procedure will most likely be in one of the five stages of exercise change at the time cardiac rehabilitation is ordered by their physicians. Those individuals who have exercised regularly as part of their personal lifestyle prior to their cardiac event will most likely continue to do so. Yet, for those individuals who have not exercised in years and may be stuck in one of the pre-action stages of change, cardiac rehabilitation may not be a viable nor meaningful activity for them even though it is prescribed and recommended by their physicians. The reason for this is because individuals found to be in the pre-action stages of change are in the most difficult stages from which one can advance. According to Prochaska et al. (1997):

> To help populations progress through the stages, [nurses] need to understand the processes and principles of change. One of the fundamental principles for progress is that different processes of change need to be applied at different stages of change. For instance, classic conditioning processes like counter-conditioning, stimulus control, and contingency control can be highly successful for individuals taking action but can produce resistance from those in precontemplation. With these individuals, more experiential processes, like consciousness-raising and

> dramatic relief can be more successful in moving them cognitively and affectively towards contemplation. (p. 71)

Many studies have been conducted utilizing the TTM as the framework to assess the stages of exercise change for individuals. Litt, Kleppinger, and Judge (2002) examined the initiation and maintenance of regular exercise behavior in older women utilizing the TTM as a means for assessing the readiness to exercise. They concluded that determining the stage of readiness to change was one of many predictors of exercise behavior.

Allison & Keller (2000) examined physical activity maintenance in elders with cardiac disease. Again, it was concluded that knowledge of the stage of readiness to adopt an exercise program could assist the clinician to individualize significant health improvement programs.

Boudreaux et al. (2003) determined that a patient may be in different stages of readiness for exercise and adoption of a low fat diet (also part of the total cardiac rehabilitation program). Knowledge of the particular stage of change would allow the health care professional to tailor the interventions accordingly thereby allowing for the individual to be able to meet their goals in both arenas.

Godin, Lambert, Owen, Nolin, and Prud'homme (2004) discovered that the stage of motivational readiness for physical activity as well as other health-related behaviors may be most useful when both recent past behavior and intention in the near future are considered. Whereas, Resnick and Nigg (2003) discovered that 35% of the participants in their study stated that they had no intention of exercising (precontemplation). Hence, knowing the stage of change that an individual is in can be useful in determining the

appropriate intervention or technique in order to facilitate change toward increased activity and exercise in older adults. In other words, specific mediators of change can be implemented that can help the individual to move on to the next stage of readiness.

Only one study was found that utilized the TTM as an actual assessment to predict stage of readiness to begin cardiac rehabilitation (McDaniel, 2004). Since this study was only about assessing an individual's readiness to begin cardiac rehabilitation, it did not examine long-term adherence rates. Therefore, no studies have been found that utilized an assessment tool designed around the TTM principles in order to predict those individuals at high risk of dropping out of a cardiac rehabilitation program.

Constructs of the TTM

In addition to the stages of change which make up the TTM, there are several other constructs within the model including decisional balance and the processes of change. These constructs and their components summarized below can be influential to an individual when making a decision to begin and maintain an exercise program such as cardiac rehabilitation.

Decisional Balance

Decisional balance is the balancing that a person does between the pros and cons of changing their behavior (Prochaska et al., 1997). It is thought that “interventions to shift the decisional balance toward reasons to change could, in theory, impact stage of change, which should then lead to better treatment outcomes” (Share et al., 2003, p. 527). In order to progress from precontemplation, the individual must target the pros more than the cons by increasing the pros of changing the behavior and save the cons for after they have progressed to contemplation (Prochaska & Velicer, 1997).

Processes of Change Construct

The *processes of change* construct includes the components of *dramatic relief* (that is, experiencing negative feelings regarding the unhealthy behavior), *self-reevaluation* (which is realizing that the behaviors a person displays are an important part of his/her identity), *environmental reevaluation* (or the understanding of the negative impact of the unhealthy behavior as well as the potential positive impact of a healthy behavior in regards to the social and physical environment), *self-liberation* (that is, making a commitment to change the behavior for the better), *counterconditioning* (which is the ability to substitute healthier alternative thoughts and behaviors for the unhealthy ones), *reinforcement management* (increasing the rewards of a healthy behavior as well as decreasing the rewards of an unhealthy one), and *stimulus control* (or the removal of any reminders of an unhealthy behavior as well as adding reminders to engage in healthier behaviors; Prochaska et al., 2002).

In addition to these components of the *processes of change* construct, two other components of the *processes of change* construct known as *consciousness-raising* and *social liberation* have been found to be more instrumental in making changes in the pre-action stages of the TTM than any of the other constructs of the model.

Consciousness-Raising. Consciousness-raising is about increasing the awareness about a particular problem behavior and its consequences. This can be accomplished by means of verbal feedback, confrontations, written educational materials, and the media (Prochaska et al., 1997). The awareness of personal risks due to health-threatening behaviors is especially important in order to proceed from precontemplation to contemplating a behavior change. Individuals will only advance to the next stage of

readiness from precontemplation to contemplation when they perceive that they can personally profit from making this effort (Ronda et al, 2001). Cognitive interventions aimed at increasing awareness of health risks can enhance a person's motivation to change (Laforge, Rossi, Velicer, Levesque, & McHorney, 1999).

Renger, Steinfelt, and Lazarus (2002) examined the effectiveness of a community-based media campaign targeting physical inactivity. This study utilized the TTM as one of its theoretical foundations. In particular, perceived self-efficacy was discovered to be a significant factor in getting people to engage in physical activity. Since television was the medium by which most people in the target population reported hearing about physical activity, it was discovered that despite any existing barriers, messages that focused on consciousness-raising among precontemplative and contemplative individuals were effective in contributing to positive behavior changes especially if the media messages used local residents filmed in familiar locations that had meaning and applicability to their daily lives.

Social Liberation. Social liberation, according to Prochaska et al. (2002), refers to an awareness within an individual that the social norms are changing in a way that supports a healthier behavior. An example of this would be a smoker finally quitting the habit due to a state-wide smoking ban for all public restaurants and bars being passed in legislature as a result of extensive lobbying by members of the public and special interest groups.

Self-efficacy and social support are the final two components of the processes of change yet to be discussed. It was discovered that these two components were examined specifically and separately in previous studies found in the literature.

Self-Efficacy. Self-efficacy expectations are about the person's belief in their own ability to execute certain activities and that by increasing their self-efficacy, they could improve upon their performance of these activities (Lechner & De Vries, 1995). Studies have indicated that how persons perceive themselves engaging in certain activities is positively related to their stage of readiness. In other words, a person in the stage of precontemplation will have a lower self-efficacy for exercise when compared to those individuals in the action stage whose self-efficacy is much higher (Arora et al., 2005). Self-efficacy is the best predictor of the stage of behavioral change. It must be rather high before an individual can progress to the other stages (Lechner & De Vries). It is thought that self-efficacy can be a powerful force when people choose to engage in certain activities because people will not participate in any undertaking that they feel may be beyond their capabilities. Likewise, people will engage in those activities they feel they are adept at performing. Self-efficacy is also a fundamental construct in that it acts as a mediator between knowledge acquisition and the attainment of certain behavioral abilities (Maibach & Murphy, 1995). Self-confidence is the primary construct in self-efficacy (Prochaska et al., 1997). It is important to note that the power or strength of self-efficacy can be a predictor of behavior change. In other words, the stronger the perceived self-efficacy of the individual, the higher the probability that they will persevere until they are successful in whatever behavior change they are attempting to make (Bandura, 1982). Self-efficacy consists of two parts: (1) the confidence that an individual will have in his/her ability to engage in healthy behaviors across different situations and (2) the temptation to engage in an unhealthy behavior that a person may experience. Based on

these definitions of self-efficacy, several studies were conducted to test the levels of self-efficacy in relation to specific behavioral outcomes.

Boudreaux et al. (2003) discovered that self-efficacy for eliminating dietary fat was highly correlated with readiness for exercise. Regular exercisers had reported more confidence in their ability to avoid fat in their diets than those who were only contemplating beginning an exercise program.

According to McAuley et al. (2006), older women with poor physical function performance due to chronic health conditions had lower self-efficacy regarding a regular exercise program. But, their conclusions were that all of these factors were modifiable. Steps can be taken to help promote physical activity participation for older women by creating environments that boost self-efficacy through persuasion, feedback performance, and social modeling.

Rodgers et al. (2002) emphasized differences between *task* self-efficacy and *scheduling* self-efficacy in accordance with Bandura's model. *Task* self-efficacy refers to an individual's confidence in his/her ability to perform a particular task or, in this case, exercising. *Scheduling* self-efficacy, on the other hand, refers to an individual actually organizing or scheduling regular physical exercise into his/her daily activities. In their work it was discovered that *task* self-efficacy was more related to behavioral intention than *scheduling* self-efficacy whereas *scheduling* self-efficacy was more related to actual behavior than *task* self-efficacy or behavioral intention (Rodgers et al.). In other words, an individual may seriously intend to adopt an exercise program and firmly believe in his/her ability to do so, but can put off actually beginning one unless he/she also possesses *scheduling* self-efficacy or is actually displaying the desired behavior.

According to Resnick and Jenkins (2000), getting older adults to adhere to a regular exercise program such as cardiac rehabilitation is extremely difficult. To improve exercise or cardiac rehabilitation outcomes, self-efficacy beliefs can be an important consideration in regards to exercise adherence because when an individual has a belief in his/her ability to continue exercising, this in turn can influence their motivation in actually following through with an exercise program or cardiac rehabilitation. Resnick and Jenkins also discovered that the use of the modified tool identified as the Self-Efficacy for Exercise Scale originally designed by McAuley in 1990 provided rich evidence of the reliability and validity of the scale when measuring efficacy expectations related to exercise and was also useful in helping to identify older adults with low self-efficacy. With all this in mind, it was decided by the principle investigator to include the Self-Efficacy for Exercise Scale in this present study.

In another study by Woodgate and Brawley (2008), recommendations were made with respect to cardiac rehabilitation and self-efficacy for physical activity. They emphasized the critical importance of using a theory-based approach when investigating the connection between efficacy and exercise adherence as a crucial study outcome. The study also stated that an understanding of the process of adjustment for individuals who have experienced a cardiac event must be obtained. These individuals are attempting to alter their lives in more ways than just adding cardiac rehabilitation to their schedules. The goal of cardiac rehabilitation is to improve physical function. The goal of the therapist is to not only help the individual to meet the goals of cardiac rehabilitation but also to help improve the participant's self-efficacy by encouraging their belief in sustaining their function and ability.

According to Wilcox et al. (2005), self-efficacy is a consistent correlate of physical activity. They concluded that when there are increases in self-efficacy, there are notable increases in physical activity behavior as well. Self-efficacy has been identified to be the mediator of changes in physical activity (Wilcox et al.).

Brassington et al. (2002) reported that changes in self-efficacy were significantly correlated with 7 to 12-month exercise adherence. Changes in self-efficacy should not only be the target for interventions but should also be evaluated as a therapeutic outcome for individuals in their self-perception of fitness achievements (Brassington et al.).

Beswick et al. (2005) suggested that to improve cardiac rehabilitation adherence, increases in patient self-efficacy should be considered. This can be accomplished by having them interact with previous patients through volunteer visitor mentors or by watching a film based on previous patients who have made successful lifestyle changes.

Social Support. The helping relationships that an individual seeks out to assist him/her with behavior change is recognized as social support (Prochaska et al., 2002) and was considered a possible co-variate in the present study. According to Husak et al. (2004), married patients recovering from myocardial infarction or angina were more likely to participate in cardiac rehabilitation than those who were not married. Married men were more likely to participate in cardiac rehabilitation than married women whereas more unmarried women were likely to participate in cardiac rehabilitation than unmarried men. Much of the difference with the women may have more to do with perceived roles and duties within the family structure. Married women see themselves as caring for the home and family and would therefore not feel that cardiac rehabilitation could fit into their schedules. Men, on the other hand, feel the support of their spouse and

children helpful in continuing to participate in a cardiac rehabilitation program. Social support in a broader sense, which is outside of the immediate family, may not be a strong determinant of participation in a cardiac rehabilitation program post-cardiac event (Husak et al.).

Beswick et al. (2005) reinforced the importance of spousal support in promoting self-efficacy as concluded from their review of the literature. Yet, Brassington et al. (2002) concluded that exercise-specific social support was not related to long-term adherence and that future studies should examine the different types of support (i.e., emotional) that may have more relative significance.

Perceived Benefits and Barriers to Exercise

The definition of perceived benefits are an individual's self-examination of any possible gains (i.e., increased fitness) resulting from participation in certain health-related behaviors whereas perceived barriers implies that an individual will determine if any possible barriers exist (i.e., limited time) which could prevent him/her from participating in certain health-related behaviors (Brown, 2005). According to Janz, Champion, and Strecher (2002), the concepts of perceived benefits and barriers applies to an individual's belief system and that people will take action to prevent, screen for, or to control unhealthy conditions if they see themselves as vulnerable to succumbing to them. In other words, if individuals believe a particular action could have potentially serious consequences, if they believe that a certain course of action could be beneficial in reducing their risks of contracting the condition or reducing its severity, and if they believe that the benefits far outweigh any possible barriers or costs to taking said action, they will do so.

Song and Lee (2001) conducted a study examining the effects of a 12-week cardiac rehabilitation exercise program on motivation and health-promoting lifestyles. A convenience sample of 114 adults was selected and placed in one of two groups. The experimental group comprised 57 adults meeting the criteria to enter the cardiac rehabilitation exercise group who would participate in a 12-week cardiac rehabilitation program. The comparison group included 57 adults who met the inclusion criteria but who had chosen not to participate in the cardiac rehabilitation program. The exercise group was interviewed and pre-tested prior to beginning the program and then contacted 12 weeks later for the post-test and interview. The comparison group was interviewed and pre-tested prior to discharge from the hospital and again 12 weeks later so that the duration of the study would be the same as with the exercise group. The exercise group improved significantly in their perceived benefits, perceived barriers, and perceived self-efficacy whereas the comparison group's scores either were unchanged or only slightly improved after 12 weeks. The findings indicated that different motivational variables were modifiable and should be considered when developing health promotion programs.

Stutts (2002) conducted a study examining the determinants of physical activity in adults along with the perceived benefits of and perceived barriers to engaging in physical activities. The results indicated that individuals with higher levels of self efficacy for physical activity also perceived more benefits to engaging in physical activity. According to Stutts, self efficacy was discovered to be a significant predictor of regular physical activity; therefore, it follows that assisting individuals to achieve higher levels of self efficacy will result in increased participation in exercise programs. In addition, this study discovered that the primary reason given for physical inactivity was time constraints

which was an issue also identified by Ransdell, Detling, Hildebrand, Lau, Moyer-Mileur, and Shultz (2004) as one of the barriers. This particular study examined the changes in physical activity and the perceived benefits, barriers, and benefit-to-barrier differences in mothers and daughters. It was discovered that *life enhancement*, which includes improved sleep, mental alertness, and self concept received the highest mean benefit score at pre- and post-test for adult women. In this same age group, the highest mean barrier scores at pre- and post-test were for time expenditure and physical exertion. According to Ransdell et al., when designing interventions to improve physical activity in adult women, emphasizing the *life enhancemen*t benefits should be the focus. Likewise, by decreasing the perceived barriers by making exercise more convenient (time expenditure) and emphasizing that physical fitness progresses slowly (physical exertion) may result in increased participation in exercise (Ransdell et al.).

In another study of women conducted by Thanavaro, Moore, Anthony, Narsavage, and Delicath (2006), the best predictors of health promotion behavior in women without a prior history of coronary heart disease (CHD) were examined. It was discovered that women with fewer perceived barriers to CHD risk modification, higher knowledge levels of CHD, and no smoking history or family history of CHD were more likely to practice health promotion behaviors. This study also discovered that health education which focuses on health benefits alone is not always effective in changing health promotion behavior. It was suggested that having a better understanding of what the perceived barriers to a healthy lifestyle are is important in establishing effective health promotion interventions. Focusing on the barriers, however, is a more difficult and time-consuming approach to developing health promoting behaviors because of the

uniqueness of each individual. In addition, consideration to the time constraints of clinicians in busy practices was mentioned since this could potentially preclude their ability to provide any interventions designed to decrease the perceived barriers to a healthier lifestyle in their clients (Thanavaro et al.).

Summary

Based on the many developed theories surrounding behavior change, the TTM and its constructs can be a plausible way of identifying and describing the factors that influence an individual's decision about whether to remain in a prescribed cardiac rehabilitation program or not. In particular, the TTM could help us to understand that people are indeed in different stages of change and will not benefit in the same way from specific healthcare information such as the importance of cardiac rehabilitation after a cardiac event. Likewise, the TTM's constructs such as the processes of change, decisional balance, and self-efficacy as well as social support and perceived benefits/barriers to exercise are likely to be influential factors when making decisions in regards to following any prescribed exercise program post-cardiac event. Because of these many factors and their likely influence on an individual's decision to continue in a cardiac rehabilitation program, the TTM and its constructs became the foundation of the present study.

Theoretical Framework

The theoretical framework for this study was the Transtheoretical Model (TTM) of Health Behavior developed by Prochaska and DiClemente (Prochaska et al. 1997). This model identifies five stages of change: (1) Precontemplation – not intending to change behavior within the next six month; (2) Contemplation – intending to change

behavior within the next six months; (3) Preparation – intending to change behavior in the immediate future usually measured as the next month; (4) Action – have changed behavior within the last six months; and (5) Maintenance – striving to prevent relapse of previous behaviors as measured from six months to five years (Prochaska et al. 1994). A variety of disciplines including nursing and the behavioral sciences have used this theory as a theoretical framework in their studies as well (Pender, 1996; Schwab, 2000).

According to the model (see Figure 1), the different processes of change are more influential at specific stages of the change. Likewise, the constructs of self-efficacy, perceived benefits and barriers, and decisional balance are likely to be influential in helping the individual to move to the next stage of readiness to change their behavior or to begin a cardiac rehabilitation program.

The TTM was found to be an appropriate and suitable underlying theoretical framework to use since the first aim of the study sought to determine if the stage of readiness (one of the stages in the model) to begin an exercise program could be associated with an individual's risk of not completing Phase II cardiac rehabilitation and the second aim was to determine if level of self-efficacy (one of the constructs of the TTM) to begin a Phase II cardiac rehabilitation program could be associated with exercise adherence.

Significance of the Problem

No studies have been found that examined stages of change, level of self-efficacy, and perceived benefits/barriers as possible predictors for exercise adherence outcomes especially in regards to completion of Phase II cardiac rehabilitation programs. Although the studies found were relevant to the topic of interest, significant gaps in knowledge had

been identified which warranted further inquiry. With this in mind, the design of the present study was determined.

Conceptual Definitions

Physical Activity Stages of Change – The stages of behavior change as defined by Prochaska and DiClemente in the TTM (Prochaska et al., 1997) and by Marcus and Simkin in the Stages of Motivational Change model (Marcus & Forsyth, 2003):

Stage 1 = Precontemplation or not thinking about changing exercise/activity behavior.

Stage 2 = Contemplation or thinking about changing exercise/activity behavior.

Stage 3 = Preparation or doing some physical activity/exercise.

Stage 4 = Action or doing enough physical activity/exercise.

Stage 5 = Maintenance or making physical activity/exercise a habit.

Readiness for Exercise – The stage of motivational readiness for physical activity or, for this study, stage of readiness to begin a cardiac rehabilitation program is the readiness for exercise definition. Both recent and past behaviors as well as intention in the near future are considered altogether (Godin, Lambert, Owen, Nolin, & Prud'homme 2004).

Self-Efficacy – Beliefs that a person has about his or her ability to engage in an exercise or cardiac rehabilitation program is self-efficacy (Lechner & De Vries, 1995). A person's self belief or self perception regarding the ability to perform physical activity is positively related to their stage of readiness to do so (Arora et al., 2005).

Social Support – The helping relationships in a person's life that assist him/her in making behavior changes necessary to improve health are viewed as social support (Prochaska et al., 2002).

Interpersonal Support – An individual's perception of appraisal or the availability of a person close to them with whom they can discuss important and sensitive issues is interpersonal support (Cohen & Hoberman, 1983).

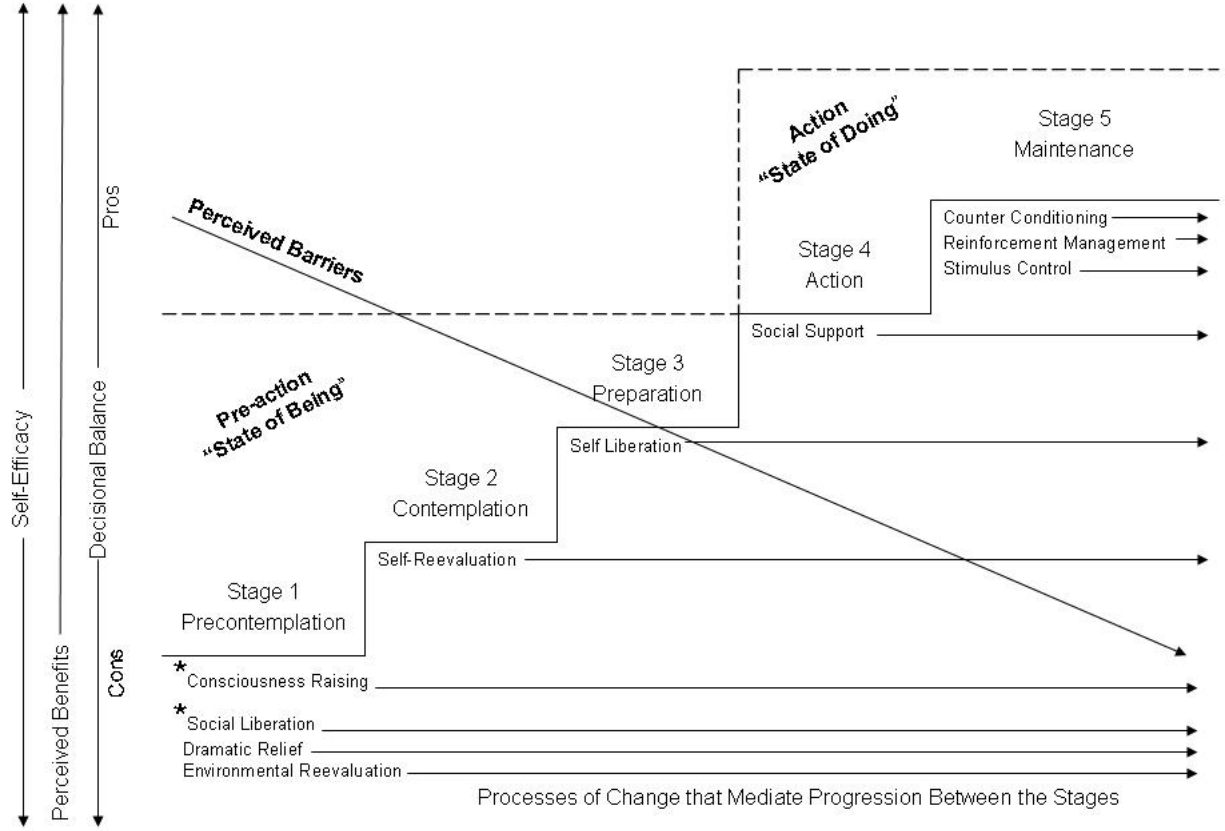
Perceived Benefits and Barriers to Exercise – The perceived benefits are how an individual evaluates any potential gain associated with participation in an exercise or cardiac rehabilitation program. Perceived barriers are those elements that an individual will identify as standing in the way of performing physical activities related to cardiac rehabilitation (Brown, 2005).

Lifestyle – The consistent and integrated way of life of an individual; this is typified by his or her manner and attitudes (Neufeldt & Guralnik, 1997).

Cardiac Event – A cardiac event refers to a happening or occurrence to an individual related to the heart such as a myocardial infarction or interventions directed at improving the heart's overall function such as angioplasty, stent placements, valve replacements, or coronary artery bypass graft surgery.

Cardiac Rehabilitation – A medically supervised and physician directed interventional exercise program to improve and promote the individual's overall quality of life and health after experiencing a cardiac event (Leon et al., 2005).

Figure 1. Influences of the Constructs of the TTM on the Stages of Change



Specific Aims and Research Questions

The aims of the study were:

1. To generate effect size for possible association between stage of readiness to begin an exercise program and length of time participating in a Phase II cardiac rehabilitation program post cardiac event.

   Question #1: *What is the relationship between individuals who have had a cardiac event who are identified to be in particular stage of readiness prior to beginning cardiac rehabilitation and their percentage of Phase II rehabilitation goals met and/or length of time in the program?*

2. To generate effect size for level of self-efficacy to begin a cardiac rehabilitation program post cardiac event and its possible association with predicting length of time an individual will remain in the Phase II portion of the rehabilitation program.

   Question #2: *What is the relationship between the self-efficacy of an individual who has experienced a cardiac event and the percentage of cardiac rehabilitation Phase II goals met and/or the period of time of participation in the Phase II cardiac rehabilitation program?*

3. To generate effect size for perceived benefits or barriers of participating in a Phase II cardiac rehabilitation program post cardiac event and its possible association with meeting Phase II cardiac rehabilitation goals and/or length of time in the rehabilitation program.

Question #3: *What is the difference between the perceived benefits of individuals meeting their Phase II cardiac rehabilitation goals after experiencing a cardiac event and the perceived barriers?*

Chapter III

Methods

The methodology of the present study consisted of the utilization of five specific tools as well as demographics and other clinical variables in a prospective correlative design. The procedure of recruitment, observation of the subjects, and data collection took place over a five month period of time from December of 2008 to May of 2009.

Research Design

The design of this study was prospective correlative using a convenience sample of both men and women who had experienced a cardiac event such as having undergone a cardiac surgical procedure (coronary artery bypass graft surgery or cardiac valve replacement surgery), who had a myocardial infarction (MI) or a MI along with a procedure in a cardiac catheterization lab (angiogram, angioplasty, or stent placement) and who had received a physician's order to attend a Phase II cardiac rehabilitation program. The subjects were assessed by use of the identified tools for this study. In addition, a baseline functional assessment was obtained from the cardiac rehabilitation record in the form of metabolic equivalents of task (MET). Data were collected over a two-month period of time. Patients were assessed as they began inpatient cardiac rehabilitation. Outcome data were later collected such as dates that the Phase II cardiac rehabilitation was completed or when individuals dropped out of the program.

The rationale for this design was to examine if there were any significant relationships or associations (mediating as well as moderating) among the variables based on the supportive evidence provided in the literature. Specifically, this study tried to determine if one or several variables could be associated with the outcome of interest –

length of time of participation in cardiac rehabilitation, or completion of the rehabilitation program. The rationale for choosing a prospective design was because some of the variables needed to be measured as they occurred over time. There were also other variables examined retrospectively (i.e., history of exercising, stage of readiness prior to surgery, etc.) to determine if any co-variables existed within the model.

Based on this type of design, the following assumptions were identified (1) study variables did not seem to show co-variances in any studies that were conducted in the past using the same populations; (2) utilized a conceptual framework that supports any potential relationships between the variables; (3) a tested theory on which potential relationships between the variables did not exist; (4) the variables were present in the population under examination and were acquiescent to the study; and (5) no variables were influenced – they were studied as they genuinely existed (Brink & Wood, 1998).

Sample and Setting

The sample was drawn from one cardiac rehabilitation center located in one tertiary care center in a large metropolitan area. Inclusion criteria were men and women between 35 and 80 years of age who had experienced a cardiac event (coronary artery bypass graft/cardiac valve replacement surgery, MI, or MI with a cardiac catheterization lab procedure), were able to ambulate independently prior to their events, and could read, write, and speak/understand English. Exclusion criteria were those patients who may have had cognitive deficits or a documented underlying psychiatric condition that would impair full participation in the study.

Because this was a pilot study, a limited number of participants were recruited. Keeping the total number of subjects between 20 and 30 enables the researcher to test for

effect size. Having a smaller sample size will also help the principle investigator (PI) to test and possibly reshape or add hypotheses/research questions for a future larger study. A pilot study will allow the opportunity to solve problems that arose during its course thus improving the design and method implementation of a future larger study. A pilot can also help in determining the number of subjects needed to power a larger study. In addition, a pilot study permits evaluation of the reliability, validity, and utility of the measurement tools (Brink & Wood, 1998).

Instruments

Four-Item Exercise Stages of Change Questionnaire

In order to identify the stage of readiness to begin an exercise program prior to entering cardiac rehabilitation, the Four-Item Exercise Stages of Change Questionnaire or hereafter referred to as the Physical Activity Stages of Change (PASC) developed by Marcus, Rossi, Selby, Niaura, &Abrams in 1992 was used (Marcus & Forsyth, 2003). This four-item questionnaire categorizes individuals into one of the five stages of change in the TTM (Jue & Cunningham, 1998).

According to Marcus and Forsyth (2003), the key concept in the model developed by Prochaska and DiClemente from which the PASC is derived is *stages of change*. For the PASC, the authors preferred to call this concept the *stages of motivational readiness for change* in order to emphasize the fact that their model focused on both the motivation for change as well as actual behavior change. So, in the model that Marcus and Simkin developed in 1993, their five stages of change are very similar in nature to the five stages of change developed by Prochaska and DiClemente but contain different verbiage and definitions for each of the stages. For example, stage one of the Marcus and Simkin

model is defined as *inactive and not thinking about becoming more active* and is simply labeled the *not thinking about change* stage. This stage coincides with stage one of the TTM called *precontemplation*. See Table 1 for the other stages as they relate to the TTM.

Table 1. The Stages of Motivational Readiness for Change and the TTM

Stage	Motivational Readiness for Change	Transtheoretical Model
1	Not Thinking about Change	Precontemplation
2	Thinking about Change	Contemplation
3	Doing Some Physical Activity	Preparation
4	Doing Enough Physical Activity	Action
5	Making Physical Activity a Habit	Maintenance

The questionnaire comprises four items which were actually declarations that the subject either had to agree with or not. For example, the first question states, “I am currently physically active” and the second question states, “I intend to become more physically active in the next six months.” There are two more questions that will help to assist in identifying which of the stages in the model the individual seems to be. The scoring of this questionnaire was done according to whether the subject answered yes or no to one question and pairing it with the response to the others. "Yes" answers were given a score of one and "no" answers were given a score of zero. With that in mind, the scoring algorithm is described below:

If (question 1 = 0 and question 2 = 0), then you are at stage 1.

If (question 1 = 0 and question 2 = 1), then you are at stage 2.

If (question 1 = 1 and question 3 = 0), then you are at stage 3.

If (question 1 = 1, question 3 = 1, and question 4 = 0), then you are at stage 4.
If (question 1 = 1, question 3 = 1, and question 4 = 1), then you are at stage 5.
(Marcus & Forsyth, 2003).

According to the authors, the kappa index of test-retest reliability was > 0.78 over a 2-week period. Concurrent validity was established by its significant association with another tool (used in the study by Jue & Cunningham) and cross-validity was demonstrated by utilizing two different samples.

Readiness for Lifestyle Change Inventory

The Readiness for Lifestyle Change Inventory (RLCI) or Readiness for Exercise (RE), a newly developed and untested tool by Krisko-Hagel (unpublished; 2008) will be used for comparison and to test its reliability. The instructions for the subject for the use of the tool were to read each question and circle the one answer that most closely applied to them before they had their cardiac event. In other words, this questionnaire sought to obtain lifestyle behaviors retrospectively. The questionnaire consisted of a total of six questions that each dealt with a particular lifestyle behavior (see Appendix A). For each of the six questions, one of five answers could be selected that corresponded with one of the five stages of readiness in the TTM.

This tool was initially tested for face validity only on a small, convenience sample of thirteen women and five men recruited for a separate, unrelated heart study regarding the use of mindfulness techniques. Because no statistical analyses were conducted to test for significance, no reliability or validity were scientifically established. Based on the observations made with the small sample in the mindfulness cardiac study, there appeared to be more individuals demonstrating progression to a higher stage of readiness

than those who were either unchanged or actually digressed to a lower stage of readiness, which was expected. These results have not been published.

Self-Efficacy for Exercise Scale

To measure the level of self-efficacy for exercising, the Self-Efficacy (Barriers) to Exercise Scale (SEE) by Resnick and Jenkins (2000) was used. This tool is a revision of McAuley's 1990 (unpublished) self-efficacy barriers to exercise measure (Resnick & Jenkins). This 11-item instrument focused on self-efficacy confidence related to the ability to continue exercising in the face of any existing barriers (see Appendix B). Each question included a Likert-type scale ranging from 0 (not confident) to 10 (very confident). The subject was instructed to circle the number most closely associated to how confidently they felt about exercising 3 times a week for 20 minutes if a particular barrier existed such as being worried about exercising causing further pain or if they did not enjoy the exercise. To score the tool, all of the numbers circled were to be added together and then an average was calculated. The potential scores obtained can range anywhere from zero to 10. The higher the average score, the more confident the subject was about exercising in the face of any existing barriers. There was evidence of internal consistency (alpha coefficient of .92) and validity based on confirmatory factor analysis (Resnick & Nigg, 2003).

Exercise Benefits and Barriers Scale

To assess the perceived benefits and barriers to exercise as well as determining the perceived benefits to barriers ratio, the Exercise Benefits and Barriers Scale (EBBS) by Sechrist, Walker, and Pender (1987) was utilized. The items from the scale were obtained by the authors inductively from interviews and from the literature.

This tool comprises 43 statements that related to ideas about exercising such as “I enjoy exercising” or “I will prevent heart attacks by exercising.” For each statement, the subject could choose from one of four responses: (1) strongly agree; (2) agree; (3) disagree; or (4) strongly disagree. Each of the four answers was weighted by a numerical value: strongly agree = 4, agree = 3, disagree = 2, and strongly disagree = 1. The potential scores obtained can range anywhere from 43 to 172. The higher the score obtained, the more positively the individual perceived exercise to be.

The reliability of this tool was confirmed using Cronbach’s alpha resulting in r = .95 for the benefits scale and .89 for the barriers scale. To determine the construct validity of the tool, a literature review of benefits and barriers related to exercise was conducted resulting in the development of a questionnaire using the identified elements. The questionnaire was then presented to a panel of four nursing researchers (also familiar with the literature) so that feedback about the questionnaire content, format, and scoring procedures could be obtained (Sechrist et al.).

Health Promotion Lifestyle Profile II

To measure an individual’s present way of life or personal habits, the Health-Promoting Lifestyle Profile II (HPLP II, 1995) by Walker, Sechrist, and Pender (1987) was used. The instrument’s 52 questions were spread out over six subscales: health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management. For the present study, only two of the subscales were utilized. The physical activity subscale (which included eight items) was chosen so that the profile in regards to exercise could be obtained. Secondly, the interpersonal relations subscale (which included nine items) was included in order to determine whether interpersonal

relationships or social support were related to cardiac rehabilitation program participation duration or completion.

The questionnaire contained statements about the subject's present way of life or personal habits. For example, one statement for interpersonal relations was "touch and am touched by people I care about," and another statement for physical activity was "follow a planned exercise program." In response to each statement, the subject answered with never, sometimes, often, or routinely to indicate the frequency with which they engaged in each behavior. For scoring, each of the responses was weighted with a numerical value: never = 1, sometimes = 2, often = 3, and routinely = 4. A mean was calculated for each of the two subscale totals obtained. The potential scores obtained can range anywhere from one to four. The higher the score, the more health-promoting lifestyle profile the subject had for each subscale (see Appendix C).

The HPLP II was tested by the authors (Walker et al., 1987) on a convenience sample of literate volunteers recruited from the general adult population in two mid-western states. These adults were recruited from colleges as well as corporate and industrial worksites. Recruitment was also drawn from adult service, social, and recreational organizations. In addition, the authors paid particular attention to including subjects who participated in health-promoting behaviors with differing ranges of frequency. The total instrument was found to have a high internal consistency with an alpha coefficient of .92. To evaluate stability, the HPLP was administered twice to a sample of 63 adults at an interval of 2 weeks. Pearson *r* for the total scale was .93 and ranged from .81 to .91 for the sub-scales (Walker et al. 1987). For this type of instrument, a reliability of .80 was suitable according to the developers' criteria. The developers of

this tool indicated the HPLP appeared to have sufficient validity and reliability to be used by anyone wishing to describe the health-promoting component of lifestyles in various populations (Walker et al.). The HPLP was modified and updated in 1995 and renamed the HPLP II. The other subscales in the tool (health responsibility, nutrition, spiritual growth, and stress management) were not included in the questionnaire for the present study since the information that would be obtained through them would not be relevant.

Social Support

In order to determine whether interpersonal relationships or social support were related to cardiac rehabilitation program participation duration or completion, the Enhancing Recovery in Coronary Heart Disease (ENRICHD) Social Support Instrument (SS) by Mitchell et al. was utilized (2003). This questionnaire contained seven questions pertaining to the presence of any close or intimate relationships (existence of a social network) that are significant and supportive (instrumentally or having tangible help) and emotionally or caring to the subject's overall well-being. For example, one question asked, "Is there someone available whom you can count on to listen to you when you need to talk?" while another asked, "Is there someone available to you who shows you love and affection?" In response to each question, the subject answered with none of the time, a little of the time, some of the time, most of the time, and all of the time. Only the last question was different. It asked, "Are you currently married or living with a partner?" The response to this question is either "yes" or "no." For scoring, each of the responses was weighted with a numerical value: none of the time = 1, a little of the time = 2, some of the time = 3, most of the time = 4, and all of the time = 5. For the last question, the answers were weighted with y = 1 and no = 0. The range of possible scores for one

individual could be anywhere between zero and 31. All of the values for each of the seven questions on the instrument are added together in order to obtain an overall score for the individual. The higher the score, the more love and support the subject feels exists in his/her life (see Appendix D).

The SS was tested in a pilot study by the authors (Mitchell et al., 2003) on 196 volunteers comprised of men and women who had recently suffered an acute MI. The subjects were enrolled in the study while they were still in the hospital but several days after their cardiac event. The sample was drawn from eight clinical centers across the United States. There were 121 men and 74 women (one participant failed to record gender) in the sample. The instrument was found to have a high internal consistency with a Cronback alpha coefficient of .86 ($p < .01$). The SS showed a high correlation with another established tool that measured perceived social support to demonstrate convergent validity. Pearson *r* for the instrument was .62 ($p < .0001$; Mitchell et al.).

Demographics and Clinical Variables

The subject's medical record was used to obtain the following information: age, gender, race/ethnicity, diagnosis, ejection fraction, marital status, existence of any co-morbidities, baseline functional ability (MET level) as assessed by the cardiac rehabilitation staff, and contact information. According to the American Heart Association (2009a), the metabolic equivalents or METs refers to the measure of an individual's metabolic rate while performing any physical activity. To do the actual measuring requires the individual to wear a mask in order to determine his or her oxygen consumption and the carbon dioxide exhaled. The METs fitness level ranges from 1.5 (the lowest exercise capacity) to 20.0 (the highest level). The average fitness level is 8

METs (American Heart Association). According to the cardiac rehabilitation staff, individual patient CR Phase II MET level goals are determined after the initial interview and physical assessment. From the interview, the CR therapist learns which area of life the CR patient wishes to return to (basic living, occupational, or sports and leisure) and the care plan is developed based on these interests. With these needs in mind, the therapist will focus on frequency as well as the duration of certain exercises and apply the recommendations from an American Heart Association (2009b) guideline of general physical activities defined by level of intensity (see Appendix E) to arrive at a MET level goal.

Other information that was gathered was the subject's highest level of education and history of exercise before the cardiac event. This information was obtained at the initial contact by asking the following questions: (1) *Have you exercised before? If so,* (2) *How often (once a week, twice a week, etc.)?* (3) *Did you work up a sweat?* (4) *Had you experienced any shortness of breath?* and (5) *How much did you increase your heart rate?* In addition, the subject was asked if it would be permissible to contact him/her at home in approximately 6 to 8 weeks for a follow-up interview which consisted of the following questions: (1) *Did you participate in cardiac rehabilitation? If not,* (2) *Why? If so,* (3) *How long did you participate?* (4) *What activities did you participate in?* (5) *What percentage of cardiac rehabilitation goals was met?* (which most of the subjects were unable to answer) and (6) *How would you rate your health before the cardiac event, right now, and what you expect your health to be in the next six months?* All questions were decided by and developed by the researcher for purposes of answering the research questions and to examine whether any variables may possibly exist that could influence

the study results. These questions were not tested for reliability or validity for this study (see Appendix F).

Procedure

Subject identification and recruitment was the first aspect of the study protocol. Each weekday morning, the PI approached the cardiac rehabilitation staff for a list of patients with new orders to attend cardiac rehabilitation. The initial screening comprised the patient's age and diagnosis in order to determine eligibility. Next, the PI went to the inpatient units of the identified potential subjects for recruitment. The potential subject's nurse was approached to help further determine the subject's eligibility. Once eligibility was established, the potential subject's nurse entered the room and either read from a script or had the potential subject read the script (see script in Appendix G) and check either *yes* or *no* as to whether he or she was interested in being a part of this study. If the subject checked the *yes* box, then the PI entered the room to further explain the study, inform the subject of his/her rights as a human subject, obtain informed consent, and conduct the initial interview. If the subject checked the *no* box, nothing further was required from the individual and he/she was removed from the list of potential subjects. This prevented the possibility of coercion of the subject by the PI.

Next, the enrolled subject's medical record was reviewed to obtain other needed information. Over the next several weeks, the subject was monitored via the electronic medical record for discharge instructions and medications, Phase II cardiac rehabilitation admission and progress, and for any possible hospital readmissions.

Human Subjects Considerations

Both the University of Minnesota and Allina Hospitals and Clinics Institutional Review Boards (IRB) reviewed the application of this expedited study. Patient names were not on any of the study materials or tools. All materials and tools were, instead, coded for each subject for identification purposes. Only the PI had access to all information and records. All study materials and information have been kept in a locked file. Any information kept electronically was only accessible by password to the PI. In addition to ensuring that the safety of all potential participants in the present study was maintained, permission for a limited access of patient charts was requested of each subject so that the investigator could obtain pertinent information related to diagnosis, physician orders for cardiac rehabilitation, and status of physical function and adherence to the Phase II cardiac rehabilitation exercises.

Questions in the questionnaires that discussed certain health behaviors or lack of healthy lifestyle practices could potentially cause some mental or emotional distress for some individuals. The PI addressed these issues and concerns in the signed consent form as well as offered the subject specific and appropriate resources upon request. In addition, all subjects were assured that they did not have to answer any question that made them feel uncomfortable.

The Research Subjects Bill of Rights (see Appendix H) was given to each individual along with a copy of the signed consent (see Appendix I) which contained the PI's contact information in the event the subject needed to contact her with any questions, concerns, new information, or the desire to drop out of the study. In addition, a Health

Insurance Portability and Accountability Act (HIPAA) permit (see Appendix J) was signed by the subject thus allowing the PI to review the subject's medical record.

Data Analysis

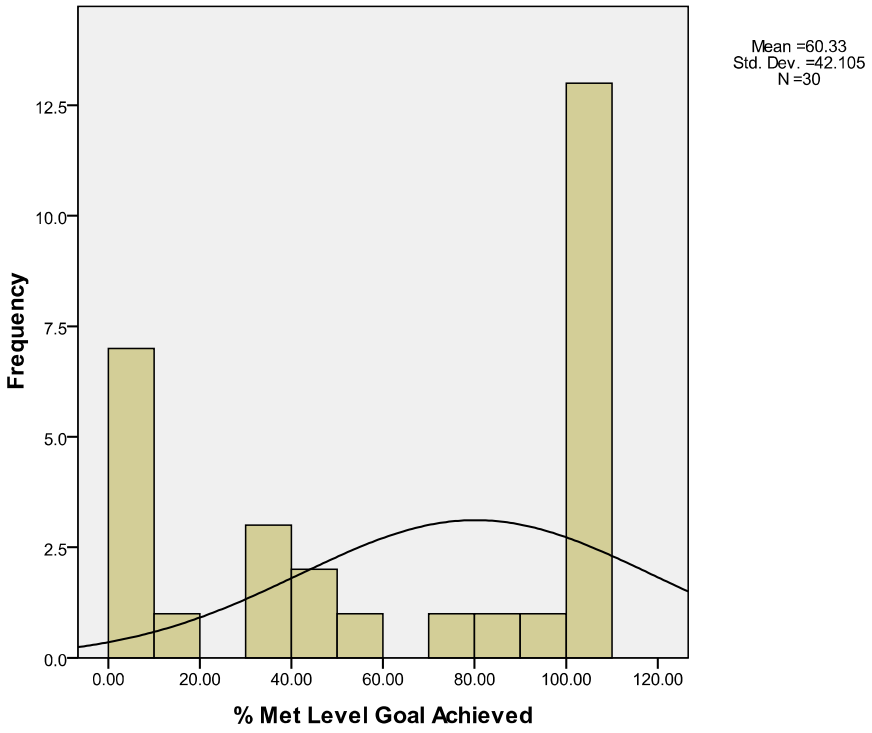
Preparation of the Data

Since the subjects were instructed to not answer a question if it made them feel uncomfortable, skipped questions were handled in the following way: the particular question would be eliminated from the survey for that person and the averages obtained for the final score of that particular instrument would be based only on the number of questions answered. In all, only one subject skipped a question on one of the instruments while another subject circled between "agreed" and "disagreed" on the same instrument and was therefore counted as "disagreed."

The raw data that were obtained were merged into frequency tables and examined for accuracy. Next, the definitions of the variables as well as the value codes were applied to each of the variables in the tables. Finally, SPSS Version 11 software was used to complete the analysis. The frequencies of the data were analyzed for normality and the distribution of the percentage of the study sample that met their cardiac rehabilitation goals was found to not be a normal distribution but was instead heavily skewed to the right (see Figure 2). According to these results, the percentage of the rehabilitation goals met was dichotomized at the 77.5% point on the graph for logistic regression. In other words, there appeared to be a natural division at 77.5%. Because multi-variability could not be analyzed using linear regression, the data needed to be dichotomized and analyzed using logistic regression analysis.

In order to test for comparisons between several groupings of the sample (i.e., males to females, those individuals who regularly exercised to those who did not, and those who had less than or equal to a high school level of education to those who had more than a high school level of education), the non-parametric Mann-Whitney *U*-test was applied which accomplishes the same purpose as a *t*-test does when applied to a normal distribution (Polit, 1996).

Figure 2. Analysis of time in cardiac rehabilitation and goals met



Testing the Research Questions

Aim 1. In Aim 1, the statistical analysis was accomplished using both logistic regression and the Kaplan-Meier survival analysis. Logistic regression analysis was utilized to test the relationship between individuals who have had a cardiac event identified to be in the pre-action stages of readiness prior to beginning cardiac rehabilitation and their percentage of Phase II rehabilitation goals met. The Kaplan-Meier

survival analysis was utilized to test for the length of time in the cardiac rehabilitation program.

Survival analysis is a branch of statistics which deals with the observation of time to an event. The topic for survival analysis is called reliability theory or reliability analysis in the engineering field (time to failure) and duration analysis or duration modeling in economics or sociology. Survival analysis in the present study attempted to answer a question such as: what is the proportion of patients with orders for Phase II cardiac rehabilitation who continued to attend after discharge from the hospital through to completion of the program (Lee & Wang, 2003)?

The survival function is the object of primary interest and is denoted as "S" in the following equation: $S(t) = Pr(T>t)$ where t is a specific time, T is a random variable denoting the subject's completed time in the Phase II cardiac rehabilitation program, and Pr stands for probability. In other words, the survival function is the probability that the time completed in the program is greater than a specified time. When entering the data, it is assumed that S = 1 which would indicate that the subject completed the program whereas S = 0 would indicate that the subject did not complete the program (Lee & Wang, 2003; Miller, 2003, UCLA Academic Technology Services, 2009).

To obtain the curve, the Kaplan-Meier function was used. To study the relationships (if any) of the potential co-variants, a Cox Regression analysis was done which is the extension of traditional regression where the association of covariates to the time to an event could be determined.

Aim 2. In Aim 2, the statistical analysis was accomplished using both logistic regression and the Kaplan-Meier survival analysis to test the period of time of

participation in the Phase II cardiac rehabilitation program. Bi-variate comparisons were tested using Spearman's correlations. This analysis was utilized to test the relationship between self-efficacy of an individual who had experienced a cardiac event and the percentage of cardiac rehabilitation Phase II goals met. Spearman's correlation is a non-parametric equivalent of the Pearson's *r* test (for normal distributions). This statistic is applied when the dependent variable is measured by use of an ordinal scale or when one or both variables being tested is critically skewed. It is also often applied when the total sample size is less than 30. In order to do the computations, the two variables must be rank ordered. Next, the differences between the ranks for the two variables are determined and the difference is squared. The sum of the squared differences is used in the following formula (see Figure 3):

Figure 3. Sum of squared differences

$$r_s = 1 - \frac{6\,(\sum D^2)}{N\,(N^2 - 1)}$$

The range can extend from - 1.00 through 0.00 to + 1.00 like the Pearson's *r*. The higher the positive value, the stronger the relationship is between the variables. The closer the results to the value of - 1.00, the greater the tendency is for the two variables to be inversely related (Polit, 1996).

Aim 3. In Aim 3, the statistical analysis was once more accomplished using both logistic regression and the Kaplan-Meier survival analysis to test the period of time of participation in the Phase II cardiac rehabilitation program. Spearman's correlation was also used again to analyze the associations between the perceived benefits of individuals

meeting their Phase II cardiac rehabilitation goals after experiencing a cardiac event and the perceived barriers.

Chapter IV:

Research Results

Description of the Sample

Fifty-eight patients were assessed for eligibility. Twenty-five were excluded: four did not meet the inclusion criteria, fifteen refused to participate, and six were excluded due to other reasons such as high acuity, complications from surgery or treatment, and death. Thirty agreed to participate in the study. All subjects completed the questionnaires and answered all of the initial interview questions by the PI. Twenty-eight subjects were discharged to home while two subjects were discharged to a transitional care facility or rehabilitation center and then later to home. One subject who was contacted by phone eight weeks after her discharge from the hospital reported to the PI that she never entered the Phase II cardiac rehabilitation program because of insurance issues. Two other subjects were unable to be reached for their follow-up phone call after numerous attempts as well as leaving messages to return the calls. Because the PI had authorization to examine all the subjects' medical records, it was discovered that one of the two subjects who was unable to be reached had never begun the Phase II cardiac rehabilitation program post discharge because he continued to experience unstable angina and was therefore prohibited from participation per physician's orders. The other subject that was unable to be reached by phone had never entered the Phase II cardiac rehabilitation program because her insurance would not cover it. She was therefore given an exercise plan with instructions by the inpatient cardiac rehabilitation staff prior to her discharge home. As a result, these three subjects were unable to complete the study.

Table 2. Sample Ages by Gender

Gender	n (%)	Mean Age (years)	Range (years)
Male	21 (78%)	61.2	46 - 79
Female	6 (22%)	59.5	44 - 78

Table 3. Sample Demographic Characteristics - Age

Age in Years	Males - n (%)	Females - n (%)
44 to 49	2 (10%)	1 (17%)
50 to 59	9 (43%)	3 (50%)
60 to 69	4 (19%)	1 (17%)
70 to 79	6 (29%)	1 (17%)

A total of twenty-seven subjects completed the entire study. Twenty-one of the subjects were men and six were women (see Table 2). The ages of the subjects ranged from 44 to 79 years of age with a mean age of 60.8 years (see Table 3). Twenty-five of the subjects were Caucasian, one was Latino/Hispanic (male), and one was East Indian (male). Nineteen of the subjects were married, four were divorced, two were single, and two were widowed (see Table 4). On the whole, the sample was well educated. Their formal educational levels ranged from 10^{th} grade in high school to a doctorate degree (see Table 5). The females were generally more educated than the males with 83% having more than a high school diploma compared to 67% of the males. One woman (17%) out of six had less than or equal to a high school education when compared to nine men (43%) out of 21 (see Table 5).

Table 4. Sample Demographic Characteristics - Marital Status

Marital Status	Males - n (%)	Females - n (%)
Single	1 (5%)	1 (17%)
Married	17 (81%)	2 (33%)
Widowed	—	2 (33%)
Divorced	3 (14%)	1 (17%)

Table 5. Demographic Characteristics of Study Sample - Education

Educational Level	Males - n (%)	Females - n (%)
< High School	1 (5%)	1 (17%)
High School	5 (24%)	—
Post-secondary	6 (29%)	—
College Degrees	9 (43%)	5 (83%)

More males than females were married (81% compared to 33% respectively). There were no widowed males whereas there were two widowed females. Divorced males were three to one in comparison to the number of divorced females. There was one single male and one single female in the study.

Eleven of the subjects had undergone open-heart surgery. Of the eleven, six received a CABG (one had a MI prior to having the CABG), four had valve replacements, and one had a combination of CABG and aortic valve replacement. Of the four subjects who received valve replacement only surgery, one received an aortic valve replacement (AVR) only while another AVR also received a pacemaker insertion. Of the

remaining valve replacements, one was a mitral valve (MVR) only replacement while the other was both an AVR and MVR (see Table 6).

Seventeen of the subjects had suffered an acute myocardial infarction of which fifteen were treated in the heart catheterization laboratory, one underwent a coronary artery bypass graft (CABG) surgery, and one was treated medically. All fifteen who were treated in the heart catheterization laboratory were given a percutaneous transluminal coronary angioplasty (PTCA) with a stent placement (see Table 6).

Table 6. Diagnoses and Treatments of Study Sample

Diagnosis of MI	Males - n (%)	Females - n (%)
MI treated medically	1 (5%)	—
MI w/ PTCA & Stent	10 (48%)	5 (83%)
Cardiac Surgery	10 (48%)	1 (17%)

There were many disparities identified in the sample between the two genders in this study. First of all, 21 males were recruited into the study compared to only 6 females. The average age of males was 61.2 years and females was 59.5 years. Of the males, 10 underwent cardiac surgery compared to only one female and 10 males were treated in the cardiac catheterization lab compared to five females (only one male was treated medically). The average age of the males who underwent cardiac surgery was 63 compared to the lone female who was 57. The average age of males who underwent treatment in the cardiac catheterization lab was 56.5 years of age compared to 60 years of age for females. The one female who underwent cardiac surgery did so for a mitral valve

replacement whereas of the 10 surgical males, six were for a CABG, three were for a valve replacement, and one was a combination of CABG and valve replacement.

Table 7. Stages of Behavior Change of Study Sample by Gender

Stage of Change	Males - n (%)	Females - n (%)
Precontemplation	—	—
Contemplation	8 (38%)	1 (17%)
Preparation	3 (14%)	1 (17%)
Action	—	1 (17%)
Maintenance	10 (48%)	3 (50%)

Of the 27 subjects in the study, 13 were identified to be in the maintenance stage of the TTM, one was in the action stage, four were in the preparation stage, nine were in the contemplation stage, and there were no subjects identified to be in the precontemplation stage of readiness to begin an exercise program. See Table 7 for stages of change by gender.

Twenty-six subjects entered the Phase II cardiac rehabilitation program. One subject had orders to attend but never "got around to it" as was stated by the subject in the follow-up phone call. Of the twenty-six who entered Phase II cardiac rehabilitation, twenty-three completed the program. Of the men who completed their cardiac rehabilitation, 60% met 100% of their goals and 62% met at least 80% of their cardiac rehabilitation goals. Of the women who completed their cardiac rehabilitation, 50% met 100% of their goals and 67% met at least 80% of their rehabilitation goals (see Table 8).

On average, men spent 7.25 weeks in cardiac rehabilitation whereas women spent 4.3 weeks. All 21 men started their cardiac rehabilitation program (100%) compared to five out of six women (83%). Both genders were equivalent in completing their cardiac rehabilitation programs.

Table 8. Gender Differences in Cardiac Rehabilitation

Gender	Began CR n (%)	Completed CR n (%)	Time in CR mean	% CR Goals Met
Males	21 (100%)	18 (86%)	7.25 weeks	60% (100% of goals) 62% (>80% of goals)
Females	5 (83%)	5 (83%)	4.3 weeks	50% (100% of goals) 67% (> 80% of goals)

The results of this study revealed that the median survival time in cardiac rehabilitation for males was 64 days compared to 30 days for females. These results were considered to be rather interesting because of the differences between the two groups being so large. Had the size of the sample been much larger with equal numbers of males and females in the study, this trend would have resulted in a significant difference (see Table 15).

Health Before Cardiac Event, Health Now, Health in Six Months

All subjects were asked how they thought their health was before their cardiac event occurred, how they thought their health was "now" (at the time of their 8 to 10 week follow-up phone call), and how they thought their health would be in six months time. To all three of these questions, the choices were: excellent (5 points), very good (4 points), good (3 points), fair (2 points), or poor (1 point). On average, women saw their health before their cardiac event as much higher than men. At the time of the 8 to 10

week follow-up phone call, what women thought their health was "now" turned out to be just slightly higher than men on average. Both genders were about the same as to how they felt their health would be in six months time (the men were slightly higher) which was a much higher score than their health "now" scores were (see Table 9).

Table 9. Gender Health Before, Now, and in Six Months - means (ranges)

Gender	Health Before Cardiac Event	Health Now	Health in 6 Months
Male	2.81 (1 - 5)	3.29 (2 - 4)	4.35 (3 - 5)
Female	3.17 (2 - 5)	3.83 (3 - 5)	4.33 (3 - 5)

The first variable that was examined for a possible association to percentage of cardiac rehabilitation goals met/length of time an individual would remain in a cardiac rehabilitation program was how the individual perceived themselves before their cardiac event (Health Before Cardiac Event). The Cox proportional regression analysis revealed that for every increase in the score of an individual pertaining to how they felt their health was before their cardiac event, that individual was 1.2 times (small effect size) more likely to remain longer in the rehabilitation program (see Tables 11 and 12). The Spearman's rho test (see Tables 13 and 14) was very close to being significant with a modest relationship of $r_s = .35$ ($p = .07$). This demonstrates that the greater the perception of health before the cardiac event, the greater the percentage of cardiac rehabilitation goals were met. Given the small sample size, these results are of considerable interest and would be worth further examination.

The second variable examined how individuals perceived their health to be "now" (at the time of their 8 to 10 week follow-up phone call). The Cox proportional regression

analysis revealed that for every increase in an individual's score of how they felt their health was "now," they were 1.2 times (small effect size) more likely to remain in the cardiac rehabilitation program longer (see Tables 11 and 12). The Spearman's Rho test revealed a weak association between how an individual perceived their health "now" and the percentage of cardiac rehabilitation goals met with $r_s = .13$ (see Tables 13 and 14). The third variable was how individuals perceived their health to be in six months (Health in 6 Months) and also produced some very interesting results. According to the Cox proportional regression analysis, for every increase in an individual's score of how they felt their health would be in six months time, an individual was 1.9 times (medium effect size) more likely to remain longer in the cardiac rehabilitation program (see Tables 11 and 12). Likewise, the Spearman's Rho test revealed a modest relationship between ($r_s = .28$; see Tables 13 and 14) how individuals perceived their health to be in six months (Health in 6 Months) and the percentage of cardiac rehabilitation goals met. This indicates that the better the perception of future health, the greater the percentage of cardiac rehabilitation goals met.

Contrasts of Groups

When comparing specific groups regarding the percentage of cardiac rehabilitation goals met, the Mann-Whitney *U* test was utilized. Some potential differences were discovered between these groups (see Table 10). Men met 91% of their cardiac rehabilitation goals compared to women who only met 39% of the rehabilitation goals. Considering that the sample size was quite small (n = 27) with 21 men and only six women, the results are worth considering for further study because of the large disparity between these two groups observed.

Surprisingly, individuals who engaged in regular exercise prior to experiencing their cardiac event completed only 61.5% of their cardiac rehabilitation goals compared to individuals who did not engage in regular exercise before their cardiac events who met 88% of their goals. When looking at gender differences, nine men (43%) were engaged in regular activity before their cardiac event compared to three women (50%). Those with less than or equal to a high school education met 40% of their cardiac rehabilitation goals compared to those individuals with greater than a high school education who met 85% of their rehabilitation goals (see Table 10).

Table 10. Rehabilitation Goals by Gender, Activity, & Education (Mann-Whitney *U*)

Variable	Median (range)	*p*-value	Males n (%)	Females n (%)
Men	91(0-100)	.41	21	
Women	39(0-100)			6
Regular activity	61.5(0-100)	.98	9 (43%)	3 (50%)
No regular activity	88(0-100)		12 (57%)	3 (50%)
≤ HS education	40(0-100)	.75	9 (43%)	1 (17%)
> HS education	85(0-100)		12 (57%)	5 (83%)

Aim 1

The first aim sought to generate an effect size for a possible association between the stage of readiness to begin an exercise program and percentage of goals met/length of time participating in a Phase II cardiac rehabilitation program post cardiac event. The Cox proportional regression analysis results that were obtained with a 95% confidence

interval (CI) revealed that for every increase in stage of readiness (Physical Activity Stage of Change) to begin a cardiac rehabilitation program, an individual was 1.2 times more likely to stay in the program (small effect size). The range for these results was from .86 to 1.7 (see Tables 11 and 12). The Readiness for Exercise revealed that for every increase in stage of readiness to begin an exercise program, an individual was 1.09 times more likely to remain longer in the cardiac rehabilitation program which was virtually no difference. The range for these results was from .82 to 1.5 (see Tables 11 and 12). Effect sizes were for the Cox regression analysis was approximated by using an effect size estimate for logistic regression models suggested by Allen and Le (2008; see Table 12).

Table 11. Relative Risk of Study Variables for Time in Cardiac Rehabilitation (Cox)

Variable	Relative Risk (RR) Ratio (95% CI)	*p*-value
Physical Activity Stage of Change	1.2(.86, 1.7)	.28
Self-Efficacy to Exercise	1.2(.88, 1.5)	.29
Exercise Benefits / Barriers Scale	1.02(.98, 1.06)	.37
Lifestyle Profile II-Relationships	.90(.40, 1.05)	.81
Lifestyle Profile II-Activity	.98(.59, 1.6)	.95
Social Support	.92 (.83, 1.02)	.11
Readiness for Exercise	1.09(.82, 1.5)	.55
Health Before Cardiac Event	1.2(.75, 1.9)	.45
Health Now	1.2(.56, 2.6)	.66
Health in 6 months	1.9(.85, 4.4)	.12
Age	.98(.94, 1.02)	.40

Table 12. Effect Size Estimate (Regression Models)

Effect Size	Odds Ratio
Small	1.2
Medium	1.7
Large	2.5

Table 13. Correlation of Study Variables and Percentage of Goals Met

Variable	Rho (r_s) re: % goals met	*p*-value
Physical Activity Stage of Change	.08	.67
Self-Efficacy to Exercise	.44	.02
Exercise Benefits / Barriers Scale	-.15	.44
Lifestyle Profile II-Relationships	-.20	.29
Lifestyle Profile II-Activity	.19	.30
Social Support	-.11	.58
Readiness for Exercise	-.02	.91
Health Before Cardiac Event	.35	.07
Health Now	.13	.50
Health in 6 months	.28	.16
Age	-.28	.13

The results of the Spearman's correlation (Spearman's Rho) revealed that the relationship between the stage of readiness (Physical Activity Stage of Change) to begin a cardiac rehabilitation program and the percentage of rehabilitation goals met indicated virtually no relationship between these variables (r_s = .08; see Table 13). Likewise, the

Readiness for Exercise variable also indicated no relationship (r_s = -.02). Effect size estimates for the Spearman's Rho analysis were estimated by using Cohen's **d** (see Table 14).

Table 14. Effect Size Estimate (Spearman's Rho)

Effect Size	**d**
Small (weak)	.10
Medium (modest)	.30
Large (strong)	.50

Next, differences between particular groups regarding the length of time in a cardiac rehabilitation program were examined using the Kaplan-Meier survival analysis. The results revealed that the median survival time (95% CI) for men was 64 days (range from 55.8 to 72.2 days) compared to 30 days (range from 21.4 to 38.6) for women. These results were considered to be of some interest due to the large differences between these two groups (see Table 15). Those individuals who regularly exercised compared to those who did not showed virtually no difference in length of time in cardiac rehabilitation. Conversely, those with less than or equal to a high school education attended CR almost 10 days more often than those with more education. The variable that had a weak relationship to the percentage of cardiac rehabilitation goals met was current lifestyle activity (Lifestyle Profile II-Activity) with r_s = .19 (see Tables 13 & 14). The Cox proportional regression analysis revealed no difference between this variable and the likelihood of remaining in the rehabilitation program longer. For every increase in the

Lifestyle Profile II-Activity score, an individual was .98 times less likely to remain in the program longer (see Tables 11 & 12).

Table 15. Time in Cardiac Rehabilitation by Gender, Activity, & Education (Kaplan-Meier)

Variable	Median survival time (95% CI)	*p*-value	Male n (%)	Female n (%)
Men	64 days(55.8, 72.2)	.14	21	
Women	30 days(21.4, 38.6)			6
Regular activity	63 days(57.2, 68.8)	.33	9 (43%)	3 (50%)
No regular activity	64 days(54.5, 73.4)		12 (57%)	3 (50%)
≤ HS education	72 days (0, 146)	.18	9 (43%)	1 (17%)
> HS education	63 days (55.4, 70.6)		12 (57%)	5 (83%)

Aim 2

The second aim sought to generate an effect size for the level of self-efficacy to begin a cardiac rehabilitation program post cardiac event and its possible association with predicting the percentage of goals met/length of time an individual will remain in the Phase II portion of the rehabilitation program. According to the results from the Cox regression analysis, for every increase in the level of self-efficacy to begin a cardiac rehabilitation program, an individual was 1.2 times more likely to remain in the program longer (small effect size; see Tables 11 and 12). The results of the Spearman's correlation (Spearman's rho) revealed that the relationship between the level of self-efficacy to begin a cardiac rehabilitation program and the percentage of cardiac rehabilitation goals met not

only generated a fairly strong relationship with a correlation of r_s = .44 (see Tables 13 and 14) but was also found to be significant as well (p = .02).

Aim 3

The third aim sought to generate an effect size for perceived benefits/barriers to participating in a Phase II cardiac rehabilitation program post cardiac event and its possible association with meeting the Phase II cardiac rehabilitation goals and/or length of time in the rehabilitation program.

According to the results, for every increase in the score of the Exercise to Benefits/Barriers Scale in regards to beginning a cardiac rehabilitation program, an individual was 1.02 times more likely to stay in the program which is essentially saying that there was no difference. The range for these results was from .98 to 1.06 (see Tables 11 and 12).

The results of the Spearman's correlation (Spearman's rho) revealed that the relationship between the score of the benefits to barriers ratio in regards to beginning a cardiac rehabilitation program and the percentage of rehabilitation goals met generated a weak relationship being inversely related at r_s = -.15 (see Tables 13 and 14). In other words, for every increase in the Exercise Benefits/Barriers score, there was a slightly decreased likelihood that an individual would complete all of their cardiac rehabilitation goals.

Logistic Regression

Because two of the variables were found to contain high odds ratios for inclusion in the model, a logistic regression was conducted (see Table 16). The results of the reanalysis of the goals met with the full model revealed an odds ratio of 1.9 for the level

of self-efficacy to exercise with a 95% CI from .86 to 4.2 and the individual's perception of their health before their cardiac event odds ratio was 1.8 within a 95% CI of .64 to 4.9.

Table 16. Reanalysis of Goals Met - Full Model

Variable	Odds Ratio (95% CI)	*p*-value
Self-Efficacy to Exercise	1.9(.86, 4.2)	.12
Health Before Cardiac Event	1.8(.64, 4.9)	.27

Hosemer-Lemeshow goodness-of-fit: $\chi^2 = 9.0$, p = .25

As a result of these findings, another logistic regression analysis of the cardiac rehabilitation goals met in a stepwise model was conducted (see Table 17). The results of this reanalysis with the stepwise model revealed an odds ratio of 1.8 (1.001 to 3.1) with a 95% CI. In other words, for every increase in an individual's score of self-efficacy to begin a cardiac rehabilitation program, that individual was 1.8 times more likely to have an increased number of goals met ($p = .05$). This is not only a very strong result but is significant as well considering the small sample size used to achieve this outcome.

Table 17. Reanalysis of Goals Met - Stepwise Model

Variable	Odds Ratio (95% CI)	*p*-value
Self-Efficacy to Exercise	1.8(1.001, 3.1)	.05

Hosemer-Lemeshow goodness-of-fit: $\chi^2 = 15.8$, p = .05

Sample Size Determination

A logistic regression was used instead of Cox to determine the sample size that would be needed to obtain these same results with significance as it relates to percentage of goals met and since there were 77% of subjects who did complete the cardiac rehabilitation program for the Cox. The following parameters of alpha = .05 and a power

= 80% was employed. As a result, the sample size that would be needed is huge (see Tables 18 and 19).

Table 18. Sample Determination for Significance (Logistic Regression)

	Odds Ratio	Sample Size Needed
Health Now	1.2	1037
Health in 6 Months	1.5	224
Self-Efficacy to Exercise	1.8	120
Physical Activity Stage of Change	.9	3074

Table 19. Sample Determination for Significance (Spearman's Rho)

	Rho (r_s) re: % goals met	Sample Size Needed
Health Now	.13	507
Health in 6 Months	.28	107
Self-Efficacy to Exercise	.44	41
Physical Activity Stage of Change	.08	1342

Other Findings

Age. The age of individuals was examined to see if this could also be of some influence. The Cox proportional regression analysis (see Tables 11 and 12) revealed that for every increase in the age of an individual, they were .98 times less likely to remain in the program longer (which is virtually no difference). The Spearman's Rho test (see Tables 13 and 14) revealed that the age of the individual had a modest relationship with an inverse correlation of r_s = -.28. In other words, the younger an individual was, the greater the likelihood that they would complete all of their cardiac rehabilitation goals.

Social Support. Social Support did not appear to be a factor influencing time in cardiac rehabilitation or percentage of cardiac rehabilitation goals met. The Cox proportional regression analysis results that were obtained with a 95% confidence interval (CI) revealed that for every increase in the Lifestyle Profile II-Relationships score, an individual was .90 times less likely to stay in the program which is the same as saying there was no difference. The range for these results was from .40 to 1.05 (see Table 11). The results of the Spearman's correlation (Spearman's Rho) revealed that the relationship between the Lifestyle Profile II-Relationships and the percentage of rehabilitation goals met revealed a modest relationship at $r_s = -.20$ (see Tables 13 and 14). In other words, for every increase in the Lifestyle Profile II-Relationships score, a person would be less likely to achieve all of their cardiac rehabilitation goals, which surprisingly does not seem to be consistent with the literature.

When examining the final scores of the SS between the two genders, it was found that on average, the men were higher with a score of 21 than women with a score of 17.5. In other words, this could be interpreted to mean that men tended to feel more social support and seemed to have significant relationships in their lives than the women did. With only two out of the six women in the study being married while two were widowed, one divorced, and one single, these results should not come as any surprise. On the other hand, there were three divorced men, one single man, and none were widowed. The remaining 17 were married.

With even deeper scrutinizing, it was discovered that the lower scores among the women occurred amongst those not married. For instance, the divorced females, the single female, and one of the widowed females each had a score of 17. The other

widowed female had a score of 14 while the two married females each had a score of 20 (see Appendix K).

A similar pattern was not found among the men; however, most of those males that were married had scores tending to be higher than the married females (average 21.5 for men and 20 for women). One divorced male's score was as low as 8 compared to the one divorced female's which was 17. There were two other divorced males that surprisingly scored fairly high (21 and 24) which could possibly be explained by the fact that they may have been in significant relationships even though they were not married.

Facts about Those Not Included in Study. Four females that had had a CABG surgery had refused to participate in the study compared to one male. One of these women had stated that she would have been willing to be in the study but was getting ready to go home. Therefore, this was considered a missed opportunity. Three of these women were in their seventies in age. The other refusals were those that had had a MI with or without a cardiac catheterization lab procedure (three women and ten men). There were two other missed opportunities (a female having had a stent placement and a male having had an AVR) because they had been given discharge orders from their physicians and were therefore unwilling to participate.

The PI was prevented from recruiting a male into the study because the potential subject's nurse claimed that there were legal issues occurring and did not think it would be appropriate which brings the possibility of selection bias into question. Three other potential subjects were eliminated because their cardiac rehabilitation was placed on hold by their physicians for various reasons.

The following subjects were not included either because they did not meet the inclusion criteria or met the exclusion criteria:

- Female in her seventies having had a CABG and was dying
- Male who was confused
- Female age 58 having had a cardiac catheterization procedure who could not read
- Female having had a CABG and possessed too many co-morbidities
- One male having had a CABG (50 years old) was prevented from being recruited by his nurse because he was too "crabby" (another selection bias possibility)
- Male who had cardiac rehabilitation postponed for six months due to having had a broken hip in addition to cardiac event
- A 78 year old male having had a stent placement who was confused

There were 12 individuals who had received cardiac rehabilitation orders from their physicians but had a single diagnosis of heart failure. Since heart failure was not included as a diagnosis for inclusion in the study, these individuals were never considered. Of these individuals with heart failure, seven were women with an average age of 83 years (six over 80 years of age and one 72 years old) and five were men with an average age of 72 years (ages 51, 66, 73, 77, and 93 years). Since individuals over the age of 80 could not be included (seven total), there were five who could have been included if heart failure would have been an acceptable diagnosis for inclusion in the study.

Two other women that had undergone open-heart surgery (one an AVR and the other a MVR with pericarditis) were excluded specifically because of age (both were 84 years of age).

Chapter V:

Discussion

This pilot study was seeking to determine the feasibility and practicality of conducting a larger study to test whether certain factors could predict exercise adherence for individuals in a cardiac rehabilitation program. The methods for this study appeared to be practical and appropriate. Several tools in the form of questionnaires that the recruited individuals completed prior to beginning cardiac rehabilitation provided the required data for analysis. Questionnaires are a convenient and fairly accurate means of data collection; convenient in that the tools can be given to an individual to complete at his/her leisure without involvement of the principle investigator (PI) and accurate if the tools have established reliability and validity. No special training of the PI was required in order to conduct the data collection portion of the study. In addition to the questionnaires, baseline functional assessments, the presence of any co-morbidities and other demographic data were obtained from the medical record.

TTM and Length of Time/Goals Met Outcomes

The first aim sought to generate an effect size for a possible association between the stage of readiness to begin an exercise program and percentage of goals met/length of time participating in a Phase II cardiac rehabilitation program post cardiac event. Of the 27 subjects in the study, 13 were identified to be in the maintenance stage of the TTM, one was in the action stage, four were in the preparation stage, nine were in the contemplation stage, and there were no subjects identified to be in the precontemplation stage of readiness to begin an exercise program.

The results of the present study revealed a small effect size in that for every increase in stage of readiness as determined by the Physical Activity Stage of Change (PASC) to begin a cardiac rehabilitation program, an individual was 1.2 times more likely to stay in the program. There was a very weak (virtually nonexistent) relationship between the stage of readiness to begin a cardiac rehabilitation program and the percentage of rehabilitation goals met (r_s = .08).

With the Readiness for Lifestyle Change Inventory (RLCI) or Readiness for Exercise (RE), a newly developed and untested tool by Krisko-Hagel (unpublished; 2008) used for comparison and to test its reliability, the results of the present study generated a small effect size and revealed that for every increase in stage of readiness to begin a cardiac rehabilitation program per RE, an individual was 1.09 times more likely to stay in the program. Likewise, there was a very weak relationship between the stage of readiness to begin a cardiac rehabilitation program and the percentage of rehabilitation goals met (r_s = -.02).

Both of these results are somewhat consistent with other studies which came to the conclusion that the use of the stages of readiness to begin an exercise program as a way to predict whether an individual will complete cardiac rehabilitation may be useful but cannot be a "stand-alone" factor (Allison & Keller, 2000; Boudreaux et al., 2003; Litt et al., 2002; Resnick & Nigg, 2003; Ronda et al., 2001). According to Allison & Keller (2000), self-efficacy was strongly correlated with physical activity (r = .56; p = .002) and stages of change (r = .54; p = .002). Boudreaux et al. (2003) also concluded that stage of readiness to begin an exercise program was strongly correlated to an individual's level of self-efficacy. According to Resnick and Nigg (2003), the stages of readiness theory can

best explain the exercise behavior outcomes in adults when combined with the self-efficacy theory. Ronda et al. (2001) also concluded that individuals in the earlier stages of readiness to begin an exercise program should receive health education which includes tactics designed to help raise the level of self-efficacy in an individual in order to improve exercise adherence rates.

For example, in the present study, two individuals were at the contemplation stage of readiness to begin an exercise program. One of them completed the program and met all of his cardiac rehabilitation goals while the other did not. These two men were about the same when it came to their marital status. The one who completed the program was single while the man who did not complete the program was divorced. Therefore, social support or lack of social support related to marital status could probably not be considered a factor for this outcome. However, the difference noted between the two men were that the one who completed the program had a self-efficacy score of 8.0 while the other man's self-efficacy score was much lower at 4.2. Likewise, two other men who were both married and were identified to be in the contemplation stage of readiness to begin an exercise program had a similar outcome to the previously mentioned men. The man who completed cardiac rehabilitation had a self-efficacy score of 6.5 compared to the man who did not complete the program with a self-efficacy score of 4.6.

At the other end of the scale, two individuals who were identified to be in the maintenance stage of readiness to begin an exercise program surprisingly had opposite outcomes. The individual who completed the cardiac rehabilitation program was a single woman compared to a married man. Again, besides the gender and marital status

differences, the other difference noted between the two were that the woman had a self-efficacy score of 7.7 compared to the man whose score was 5.1.

To help explain the marital status between the gender differences, other investigators explored the potential interrelationship of gender and marital status in cardiac rehabilitation outcomes. Husak et al. (2004) reported that married individuals were more likely to participate in cardiac rehabilitation than those who were not married. However, married men were more likely to participate in cardiac rehabilitation than married women whereas more unmarried women were likely to participate in cardiac rehabilitation than unmarried men. It was concluded that the differences with women stemmed from their perceived roles and duties in relation to the structure of the family. Single women have nobody to care for but themselves and will generally do so under most circumstances whereas married women will feel more like they have fully recovered from a cardiac event when they have returned to caring for the home and family as before rather than from completing a cardiac rehabilitation program. On the other hand, married men may have the support of their spouse and children to help them stay on task with their cardiac rehabilitation program goals because the family tends to feel that this is an important element on the road to recovery whereas single men are alone and usually lacking this type of support (Husak et al.). In the present study, it was found that social support did not generate a significant effect size to be considered a covariate (see Lifestyle Profile II-Relationships outcomes in Tables 11 and13).

Self-Efficacy and Length of Time/Goals Met Outcomes

Self-efficacy is one the constructs of the TTM. The previous section discussed the importance of examining the stage of readiness to begin an exercise program in

combination with the level of self-efficacy for exercise. The results of this present study were found to be consistent with previous studies in regards to stage of readiness as a predictor for exercise adherence. The second aim of the present study sought to generate an effect size for the level of self-efficacy to begin a cardiac rehabilitation program post cardiac event and its possible association with predicting percentage of goals met and the length of time an individual will remain in the Phase II portion of the rehabilitation program.

The results obtained revealed that for every increase in the level of self-efficacy to begin a cardiac rehabilitation program, an individual was 1.2 times more likely to stay in the program (small effect size). In addition, a medium to strong correlation was found between the level of self-efficacy to begin a cardiac rehabilitation program and the percentage of cardiac rehabilitation goals met ($r_s = .44$; $p = .02$). According to these results, it would appear that the higher the level of self-efficacy of an individual, the more likely she/he is to complete the cardiac rehabilitation program as well as achieve all rehabilitation goals. These findings are consistent with other previous studies.

Stutts (2005) concluded that self-efficacy had been demonstrated as a significant predictor for regular physical activity (2002). Likewise, according to Wilcox et al., the higher the level of self-efficacy of an individual, the higher the level of physical activity behavior will be. Woodgate and Brawley (2008) concluded that when an interventionist works with the client to try and promote improved physical function, he/she should also try to help improve the patient's self-efficacy. This can be accomplished by offering encouragement to the patient. In this way, the patient will come to believe in not only

being able to begin the cardiac rehabilitation program but will also come to believe that he/she will be able to continue in the program through to its completion.

Litt et al. (2002) concluded that self-efficacy was predictive for maintenance of behavior. Likewise, Wilcox et al. (2005) concluded that the level of self-efficacy consistently correlated with increases in physical activity behavior. Finally, Maibach and Murphy (1995) discovered that perceived self-efficacy has been shown to be a strong influence in the health behavior of an individual. Perhaps self-efficacy could be considered a "stand-alone" predictor for determining which individuals will complete their cardiac rehabilitation program as well as meet all of their rehabilitation goals and those who will not. Because of the effect size generated in the present study, self-efficacy would be a promising factor to be further studied in a future, larger study.

Perceived Benefits/Barriers and Goals Met Outcomes

The third aim sought to generate an effect size for perceived benefits/barriers to participate in a Phase II cardiac rehabilitation program post cardiac event and its possible association with meeting the Phase II cardiac rehabilitation goals and/or length of time in the rehabilitation program. The results of this present study revealed that for every increase in the score of the Exercise to Benefits/Barriers Scale (range 43 to 172 points) in regards to beginning a cardiac rehabilitation program, an individual was 1.02 times more likely to stay in the program which is virtually no difference observed. Likewise, the relationship between the score of the benefits to barriers ratio in regards to beginning a cardiac rehabilitation program and the percentage of rehabilitation goals met was fairly weak and inversely related at r_s = -.15. In scoring the instrument, the higher the score, the more positively the individual perceived exercise to be. With this in mind, the results

suggest that the higher the perceived benefits/barriers of exercise score of an individual, the lower would be the percentage of cardiac rehabilitation goals met.

Surprisingly, these results were somewhat inconsistent with previous studies in regards to perceived benefits and barriers to completing a cardiac rehabilitation program and/or meeting cardiac rehabilitation goals. Ransdell et al. (2004) concluded that decreased perceived exercise barriers may be related to increased physical activity participation. However, according to Fleury et al. (2004), there were no significant differences identified in the number or type of perceived barriers of individuals in regards to different kinds of physical activity. They recommended that further research would be needed in order to verify this.

Interestingly, Stutts (2002) discovered that low self-efficacy levels were significantly associated with higher perceived barriers and vice versa. This association was not examined in the present study but could be considered as a recommendation for inclusion in a future, larger study. Perhaps it would be interesting to discover if self-efficacy could possibly be associated with perceived benefits/barriers in determining an individual's increased involvement in physical activity.

Gender Differences

In the present study, only six women were recruited compared to 21 men in the same time period. Of the six women, only one was a cardiac surgical (MVR) patient while the other five were treated in the cardiac catheterization lab. Of the 21 men in the present study, 10 were cardiac surgicals (CABG, AVR, and MVR) and 10 were treated in the cardiac catheterization lab. The remaining man was treated medically. The average age of the males was 61.2 years compared to women's average age which was 59.5 years.

Interestingly, there were no females in the present study whom had had a CABG. However, there were several women initially examined for possible recruitment into the study having had a CABG that either refused to be in the study or were ineligible due to age, presence of co-morbidities, or were dying. These women tended to be older than the women who were treated in the catheterization lab.

There were also several women (more women than men) that were initially examined for possible inclusion in the present study but were eliminated because they had a single diagnosis of heart failure. In addition, they were mostly in their eighties and nineties (average age 83) thus making them too old for inclusion in the study. The few men that had a heart failure diagnosis were generally younger in age (average 72).

These findings are consistent with the findings in a study by Penque et al. (1998) which showed that women, on average, were generally older than men when signs and symptoms of cardiac disease occurred. They also concluded that this was a result of women being more likely to delay seeking treatment when symptoms first develop. Also, according to Legato and Colman (1991), there are more CABG surgeries performed on men than women and that generally by the time a woman is in need of this surgery, she is older and sicker than the men who have had the surgery. Goldberg (2002) states that according to the statistics, women are twice as likely to die within the first few weeks following a MI than men.

Other gender differences concerning activity and participation in the cardiac rehabilitation program were discovered. Nine men (43% of the men) and three women (50% of the women) were engaged in regular activity prior to having their cardiac events. After their cardiac events, all of the men began the cardiac rehabilitation compared to just

83% of the women. However, 86% of the men completed their programs compared to 83% of the women. On average, men met 91% of their cardiac rehabilitation goals compared to women who met 39%. Men were also in cardiac rehabilitation longer at 7.25 weeks (average) compared to women at 4.3 weeks (average). Men stayed in the program longer than women by 34 days. If you examine these results alongside the scores achieved by each gender in regards to having significant relationships or social support, an interesting picture appears. The men's average score for the SS was 21 compared to the women's which was 17.5 (range zero to 31). This would make sense since there were many more married men (81% of the men) than non-married men (three were divorced and one was single) in the sample than married women (50% of the women) to non-married women (one was divorced, one was single and two were widowed) in the sample. In other words, it would appear that more men in the present study seemed to experience a sense of social support and were involved in significant relationships than women. The married men's scores on average tended to be higher than the married females' scores too but with such a small sample size and only two married women in the study, it is difficult to say whether there really were any differences in these scores or not. This would be worth further studying.

These findings that social support could possibly be a key factor in cardiac rehabilitation outcomes is consistent with other studies. Lechner and De Vries (1995) concluded that perceived social support was associated with individuals progressing to higher stages of change. Likewise, Fleury et al. (2004) concluded that a perceived lack of social support could act as a barrier to activity maintenance. According to Litt et al. (2002), social support in addition to readiness to begin exercising was predictive of

adopting an exercise program and that social support alone was the best indicator of exercise behavior continuing up to 12 months after starting the program. Finally, Husak et al. (2004) discovered that marital status was a stronger predictor of participation in rehabilitation than other forms of social support. In fact, marital status was more strongly related to participation in cardiac rehabilitation for men than for women. According to Husak et al., the reasons for this was that married men usually would have the support and encouragement of the spouse and family to participate in cardiac rehabilitation because the family would want "dad" to do everything to get well again. Single or divorced men would more likely not have this type of support. Widowed men would have some support and encouragement from their children (if they have children) but without having the closeness of someone such as a spouse, the support may not be as great. Likewise, married women may have the support of spouse and family but the sense of returning to their previous role of homemaker and caretaker may be much stronger. A woman in the role of mother may feel like she has fully recovered once she has returned to her family role and the spouse as well as children may tend to agree, whereas single or divorced women may have more opportunity to focus on their health and invest in rehabilitation to do all that they can to get well again. Widowed women may have the support and encouragement of their children (if they have children) to participate in cardiac rehabilitation but like the married woman, she will feel that she is fully recovered once she has returned to caring for her children and family rather than herself (Husak et al.).

One final interesting discovery was how women and men saw their health before their cardiac event, "now" (at the time of the follow-up phone call 8 to 10 weeks later),

and in six months. Women saw their health as being higher than men before their cardiac event, slightly higher than men "now," and about the same as men in six months time (both having a higher score than their "now" score with women only slightly lower than men). There was nothing found in the literature that could explain this apparent potential difference but perhaps it may offer another explanation as to why women were not as likely to participate as long nor achieve as high a percentage of rehabilitation goals as men. If they saw themselves as fairly healthy to begin with and "now," then perhaps they do not need to work that hard in order to recover. This could be due to denial and according to Legato and Colman (1991), when it comes to heart attacks/disease, there is a great deal of denial for people in general and women in particular most likely due to disbelief in the possibility of having heart disease or being too frightened to consider it even being remotely possible.

Strengths and Limitations

A strength of the study is that the tools utilized (with the exception of the one untested instrument by Krisko-Hagel) have been tested for reliability and validity. Another strength lies in the fact that with this type of design, the ability to examine interactions between several variables at the same time to see which of them will vary together is easy to do (Brink & Wood, 1998).

The results of a pilot study are not intended to be generalized. Even so, there were many limitations with this study which should be mentioned that would preclude generalizing these results to the greater population. First of all, the small sample size would not be able to provide the power necessary in preventing Type II errors from occurring (failing to reject the null hypothesis when it is false). Secondly, the study drew

recruits from a convenience sample which, by the very nature of its design, is not a true representation of the population.

Out of 58 potential subjects assessed for eligibility into the study, 25 were excluded. Of the 25 that were excluded, four were excluded because of not meeting the criteria and six were excluded due to other factors such as high acuity, complications from surgery/treatment or death. But the 15 remaining that were excluded were done so because these individuals refused to participate. This may have resulted in selection bias which is another limitation of the study. It would have been very interesting to know the outcomes of these 15 individuals but in order to protect the subjects from possible coercion as well as meeting the requirements of the two IRBs, it was necessary to have the potential subject's nurse make the initial contact by means of using the prepared script from the PI (see Appendix G) for recruitment. In addition, even if the PI could have followed these 15 individuals in order to observe whether they completed their Phase II cardiac rehabilitation or not, the HIPAA regulations still would have prohibited the PI from being able to examine the medical records to extract any data. Selection bias was also possibly evident in regards to two cases where the subject's nurse prevented the PI from considering them for the present study because one was having legal issues and the other was too "crabby."

Time was yet another limitation. Some of the items in the questionnaires that referred to current exercising habits maybe would have been answered differently had the individuals been asked at a different time of year. For example, many of the individuals may have preferred participating in regular outdoor activities such as gardening, walking, running, and biking but were not doing so because of the fact that it was the winter

season in a northern climate. Again, had these questions been asked during the late spring, summer, or early fall seasons, then perhaps the answers given would have been more revealing.

Finally, the determination of CR Phase II goals by the CR therapist could be considered a limitation since the MET level measure is decided according to professional judgment after the initial interview and assessment of the subject. Because of the subjective nature of this determination, the MET level goal measure could vary widely from one therapist to the next resulting in concern regarding its reliability.

Implications for Nursing Practice

Cardiac rehabilitation is a frequently ordered interventional exercise program that follows the guidelines of the American Heart Association. Its effects on the cardiac patient's physical fitness have been discussed. Yet, with all of the benefits of cardiac rehabilitation realized, there are still a substantial number of men and especially women who do not adhere to a post-cardiac surgery exercise program (Halm et al., 1999; Cox et al., 2003; Gallagher et al., 2003; Moore et al., 2003; Clark et al., 2004; Fleury et al., 2004; Grace et al., 2004a; Grace et al., 2004b; Jackson et al., 2005).

Nurses could be influential in changing these adverse outcomes through accurate assessments (stages of change and level of self-efficacy) of post cardiac event patients and identifying those at risk of not completing a cardiac rehabilitation program. The nurse could then intervene as necessary through encouragement (to help raise level of self-efficacy in the cardiac patient) in order to improve completion outcomes. Through family teaching, the nurse could assist the spouse and/or family to better support their

loved one (especially if female) so that cardiac rehabilitation becomes the priority during their recovery period.

The findings in this study revealed that some predictors may indeed exist; therefore, further studies are recommended to develop applicable screening tools that could be used by the bedside nurse to identify those at highest risk of not completing their cardiac rehabilitation program. In addition, further studies could subsequently lead to the development of effective interventions which could be designed to help encourage an individual in an effort to increase their sense of self-efficacy for exercising and to raise the level of awareness in the spouse/family so that in conducting family teaching, the nurse will help to encourage the sense of social support needed for the cardiac individual to continue with the cardiac rehabilitation program. In addition, there may still be value in trying to increase the perceived benefits of exercising, decrease the perceived barriers of adhering to the entire cardiac rehabilitation program, and assist in moving the individual to the next stages of readiness to begin a healthier lifestyle.

Recommendations for Future Research

Since this was a pilot study intended to test its feasibility, it is highly recommended that another larger study be conducted to further test stages of change, self-efficacy, and perceived health before, "now," and in six months as predictors for adherence in a cardiac rehabilitation program. The present study used a convenience sample from one hospital and recruited 27 subjects. In addition, it is suggested that using three or four other hospitals may help to increase the number of potential subjects from which to recruit a sample. It would be well to consider employing random selection during the recruitment process to help diversify the sample so that is would be more

representative of the general population. As a result of the power analyses that were conducted, the sample size for a future larger study would need to be as great as 3,074 (which may not be feasible) for one association (PASC and time in cardiac rehabilitation) and as small as 41 (SEE and percentage of cardiac rehabilitation goals met) in order to achieve significance which would be very feasible.

As a result of the many gender disparities discovered in this pilot, it is highly recommended that there be an equal (or close to equal) number of males and females recruited for any future and larger study. By doing so, these identified gender differences could be studied more closely with more accurate comparisons being made thus resulting in more significant findings.

To decrease the possibility of selection bias, it would be helpful to expand the research team to include hospital nurses who have access to patients' medical records and would have knowledge about the patients and be able to abstract demographics, medical history other information pertinent to the study.

It would also be beneficial if the study were more longitudinal in design and conducted over a longer period of time (possibly one to two years) in order to accomplish a more thorough study. In this way, there would be a better chance of being able to meet the aforementioned recommendations.

If there could be a way to screen potential subjects prior to their hospitalization or cardiac event rather than trying to obtain retrospectively any information pertaining to stage of readiness to begin an exercise program, current level of activity, accurate perceived benefits and barriers as well as current level of self-efficacy, the data obtained would be more accurate when compared to the data obtained after the event has occurred.

Of course, trying to follow this recommendation would be next to impossible since there is no way to be able to predict when or if a cardiac event is going to happen. The closest a researcher could get to meeting this recommendation would be to screen for those individuals who are being admitted for elective CABG or valve replacement surgery and for this reason would then limit the sample to heart surgical patients only.

Finally, the two tools used for measuring the stage of readiness to begin a cardiac rehabilitation program were the RE (RLCI) and the PASC. The RE (RLCI) was an untested tool used for comparison to the PASC (a tested tool) in order to test its reliability. Because of the small effect size that the untested tool generated, it is recommended that continued testing of this tool (after making some adjustments) with a larger sample size be conducted in the future in order to determine its true reliability.

Summary

Heart disease is still the number one killer of women and men in the United States today (American Heart Association, 2006; WomenHeart, 2007). The benefits of cardiac rehabilitation after a cardiac event are well-known and established as a means to not only improve a cardiac patient's physical fitness but also to improve his/her overall quality of life (Taylor et al., 2004). Yet, there are still many men and women who either do not adhere to a post-cardiac event exercise program or do not attend at all (Halm et al., 1999; Cox et al., 2003; Gallagher et al., 2003; Moore et al., 2003; Clark et al., 2004; Fleury et al., 2004; Grace et al., 2004a; Grace et al., 2004b; Jackson et al., 2005).

The purpose of this pilot study was to first assess post-cardiac event patients prior to entering a cardiac rehabilitation program by measuring the principles of the TTM along with its constructs and secondly, to determine if any perceived benefits or barriers

existed that could identify those individuals at highest risk of not completing the Phase II portion of the rehabilitation program. By doing so, the feasibility of conducting a larger study could be assessed. The results of this pilot study were supportive of the possibility for a larger study with selected variables and the applicability of one of the chosen instruments for future investigation was established (the SEE). In addition, other variables were found to be not only interesting but potentially associated with the quality and length of rehabilitation participation and would be worth pursuing further in a future, larger study (SS, Health Before the Cardiac Event, Health Now, and Health in Six Months Time).

Conclusion

This pilot feasibility study was conducted in order to explore whether the stages of readiness, level of self-efficacy, or perceived benefits/barriers to begin a cardiac rehabilitation program post cardiac event were associated with the length of time individuals will participate in the Phase II cardiac rehabilitation program. It was not expected that the results of the stages of change and perceived benefits/barriers would be as weak or as apparently nonsignificant as they were found to be. Individuals who have had a cardiac event and are identified to be in the pre-action stages of readiness (precontemplation and contemplation) prior to beginning cardiac rehabilitation were 1.2 times more likely to remain in the program (small effect size). Additionally, a fairly weak relationship was found between individuals who have had a cardiac event and are identified to be in the pre-action stages of readiness (precontemplation and contemplation) prior to beginning cardiac rehabilitation and their percentage of Phase II rehabilitation goals met. Likewise, it was found that individuals with a higher perceived

benefits/barriers ratio were 1.02 times more likely to remain in the program (essentially the same as those with lower ratios) and a weak relationship was found between the perceived benefits/barriers of individuals and meeting their Phase II cardiac rehabilitation goals.

However, it was expected that the results of the self-efficacy variable would be positive but not to the extent observed in this pilot study. The somewhat surprising results revealed that the higher the self-efficacy of the individual, the more likely they were to remain in the rehabilitation program. There was a moderate relationship found between an individual with a higher level of self-efficacy who has experienced a cardiac event and the percentage of cardiac rehabilitation goals met in the Phase II cardiac rehabilitation program.

It is recommended that a future larger study with many of the basic designs of this pilot study be conducted including other variables discovered to be of interest such as perceived health before the cardiac event, perceived health "now," perceived health in six months time and especially gender differences. With the results of a larger future study, practical screening tools could be developed and tailored to the individual (per gender) to help the nurse at the bedside identify those at highest risk of not completing a cardiac rehabilitation program. By being able to predict these high-risk individuals through further research, it may become possible to develop appropriate interventions as a result of future research that could be applied at the bedside to improve cardiac rehabilitation outcomes and help the patient to achieve a longer and healthier lifestyle.

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Appendix A

General Physical Activities Defined by Level of Intensity

The following is in accordance with CDC and ACSM guidelines.

Moderate activity[+] 3.0 to 6.0 METs* (3.5 to 7 kcal/min)	**Vigorous activity**[+] Greater than 6.0 METs* (more than 7 kcal/min)
Walking at a moderate or brisk pace of 3 to 4.5 mph on a level surface inside or outside, such as • Walking to class, work, or the store; • Walking for pleasure; • Walking the dog; or • Walking as a break from work. Walking downstairs or down a hill Racewalking—less than 5 mph Using crutches Hiking Roller skating or in-line skating at a leisurely pace	Racewalking and aerobic walking—5 mph or faster Jogging or running Wheeling your wheelchair Walking and climbing briskly up a hill Backpacking Mountain climbing, rock climbing, rapelling Roller skating or in-line skating at a brisk pace
Bicycling 5 to 9 mph, level terrain, or with few hills Stationary bicycling—using moderate effort	Bicycling more than 10 mph or bicycling on steep uphill terrain Stationary bicycling—using vigorous effort
Aerobic dancing—high impact Water aerobics	Aerobic dancing—high impact Step aerobics Water jogging Teaching an aerobic dance class
Calisthenics—light Yoga Gymnastics General home exercises, light or moderate effort, getting up and down from the floor Jumping on a trampoline Using a stair climber machine at a light-to-moderate pace Using a rowing machine—with moderate effort	Calisthenics—push-ups, pull-ups, vigorous effort Karate, judo, tae kwon do, jujitsu Jumping rope Performing jumping jacks Using a stair climber machine at a fast pace Using a rowing machine—with vigorous effort Using an arm cycling machine—with vigorous effort
Weight training and bodybuilding using free weights, Nautilus- or Universal-type weights	Circuit weight training
Boxing—punching bag	Boxing—in the ring, sparring Wrestling—competitive
Ballroom dancing Line dancing Square dancing Folk dancing Modern dancing, disco Ballet	Professional ballroom dancing—energetically Square dancing—energetically Folk dancing—energetically Clogging
Table tennis—competitive Tennis—doubles	Tennis—singles Wheelchair tennis
Golf, wheeling or carrying clubs	----
Softball—fast pitch or slow pitch Basketball—shooting baskets Coaching children's or adults' sports	Most competitive sports Football game Basketball game Wheelchair basketball Soccer Rugby Kickball Field or rollerblade hockey Lacrosse

Volleyball—competitive	Beach volleyball—on sand court
Playing Frisbee Juggling Curling Cricket—batting and bowling Badminton Archery (nonhunting) Fencing	Handball—general or team Racquetball Squash
Downhill skiing—with light effort Ice skating at a leisurely pace (9 mph or less) Snowmobiling Ice sailing	Downhill skiing—racing or with vigorous effort Ice-skating—fast pace or speedskating Cross-country skiing Sledding Tobogganing Playing ice hockey
Swimming—recreational Treading water—slowly, moderate effort Diving—springboard or platform Aquatic aerobics Waterskiing Snorkeling Surfing, board or body	Swimming—steady paced laps Synchronized swimming Treading water—fast, vigorous effort Water jogging Water polo Water basketball Scuba diving
Canoeing or rowing a boat at less than 4 mph Rafting—whitewater Sailing—recreational or competition Paddle boating Kayaking—on a lake, calm water Washing or waxing a powerboat or the hull of a sailboat	Canoeing or rowing—4 or more mph Kayaking in whitewater rapids
Fishing while walking along a riverbank or while wading in a stream—wearing waders	----
Hunting deer, large or small game Pheasant and grouse hunting Hunting with a bow and arrow or crossbow—walking	----
Horseback riding—general Saddling or grooming a horse	Horsebackriding—trotting, galloping, jumping, or in competition Playing polo
Playing on school playground equipment, moving about, swinging, or climbing Playing hopscotch, 4-square, dodgeball, T-ball, or tetherball Skateboarding Roller-skating or in-line skating—leisurely pace	Running Skipping Jumping rope Performing jumping jacks Roller-skating or in-line skating—fast pace
Playing instruments while actively moving; playing in a marching band; playing guitar or drums in a rock band Twirling a baton in a marching band Singing while actively moving about—as on stage or in church	Playing a heavy musical instrument while actively running in a marching band
Gardening and yard work: raking the lawn, bagging grass or leaves, digging, hoeing, light shoveling (less than 10 lbs per minute), or weeding while standing or bending Planting trees, trimming shrubs and trees, hauling branches, stacking wood Pushing a power lawn mower or tiller	Gardening and yard work: heavy or rapid shoveling (more than 10 lbs per minute), digging ditches, or carrying heavy loads Felling trees, carrying large logs, swinging an ax, hand-splitting logs, or climbing and trimming trees Pushing a nonmotorized lawn mower
Shoveling light snow	Shoveling heavy snow
Moderate housework: scrubbing the floor or	Heavy housework: moving or pushing heavy

bathtub while on hands and knees, hanging laundry on a clothesline, sweeping an outdoor area, cleaning out the garage, washing windows, moving light furniture, packing or unpacking boxes, walking and putting household items away, carrying out heavy bags of trash or recyclables (e.g., glass, newspapers, and plastics), or carrying water or firewood General household tasks requiring considerable effort	furniture (75 lbs or more), carrying household items weighing 25 lbs or more up a flight or stairs, or shoveling coal into a stove Standing, walking, or walking down a flight of stairs while carrying objects weighing 50 lbs or more
Putting groceries away—walking and carrying especially large or heavy items less than 50 lbs.	Carrying several heavy bags (25 lbs or more) of groceries at one time up a flight of stairs Grocery shopping while carrying young children *and* pushing a full grocery cart, or pushing two full grocery carts at once
Actively playing with children—walking, running, or climbing while playing with children Walking while carrying a child weighing less than 50 lbs Walking while pushing or pulling a child in a stroller or an adult in a wheelchair Carrying a child weighing less than 25 lbs up a flight of stairs Child care: handling uncooperative young children (e.g., chasing, dressing, lifting into car seat), or handling several young children at one time Bathing and dressing an adult	Vigorously playing with children—running longer distances or playing strenuous games with children Racewalking or jogging while pushing a stroller designed for sport use Carrying an adult or a child weighing 25 lbs or more up a flight of stairs Standing or walking while carrying an adult or a child weighing 50 lbs or more
Animal care: shoveling grain, feeding farm animals, or grooming animals Playing with or training animals Manually milking cows or hooking cows up to milking machines	Animal care: forking bales of hay or straw, cleaning a barn or stables, or carrying animals weighing over 50 lbs Handling or carrying heavy animal-related equipment or tack
Home repair: cleaning gutters, caulking, refinishing furniture, sanding floors with a power sander, or laying or removing carpet or tiles General home construction work: roofing, painting inside or outside of the house, wall papering, scraping, plastering, or remodeling	Home repair or construction: very hard physical labor, standing or walking while carrying heavy loads of 50 lbs or more, taking loads of 25 lbs or more up a flight of stairs or ladder (e.g., carrying roofing materials onto the roof), or concrete or masonry work
Outdoor carpentry, sawing wood with a power saw	Hand-sawing hardwoods
Automobile bodywork Hand washing and waxing a car	Pushing a disabled car
~Occupations that require extended periods of walking, pushing or pulling objects weighing les than 75 lbs, standing while lifting objects weighing less than 50 lbs, or carrying objects of less than 25 lbs up a flight of stairs Tasks frequently requiring moderate effort and considerable use of arms, legs, or occasional total body movements. For example: • Briskly walking on a level surface while carrying a suitcase or load weighing up to 50 lbs • Maid service or cleaning services	~Occupations that require extensive periods of running, rapid movement, pushing or pulling objects weighing 75 lbs or more, standing while lifting heavy objects of 50 lbs or more, walking while carrying heavy objects of 25 lbs or more Tasks frequently requiring strenuous effort and extensive total body movements. For example: • Running up a flight of stairs while carrying a suitcase or load weighing 25 lbs or more • Teaching a class or skill requiring

• Waiting tables or institutional dishwashing • Driving or maneuvering heavy vehicles (e.g., semi-truck, school bus, tractor, or harvester)—not fully automated and requiring extensive use of arms and legs • Operating heavy power tools (e.g., drills and jackhammers) • Many homebuilding tasks (e.g. electrical work, plumbing, carpentry, dry wall, and painting) • Farming—feeding and grooming animals, milking cows, shoveling grain; picking fruit from trees, or picking vegetables • Packing boxes for shipping or moving • Assembly-line work—tasks requiring movement of the entire body, arms or legs with moderate effort • Mail carriers—walking while carrying a mailbag • Patient care—bathing, dressing, and moving patients or physical therapy	active and strenuous participation, such as aerobics or physical education instructor • Firefighting • Masonry and heavy construction work • Coal mining • Manually shoveling or digging ditches • Using heavy nonpowered tools • Most forestry work • Farming—forking straw, baling hay, cleaning barn, or poultry work • Moving items professionally • Loading and unloading a truck

Source: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. *Promoting physical activity: a guide for community action*. Champaign, IL: Human Kinetics, 1999. (Table adapted from Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of energy costs of human physical activities. *Medicine and Science in Sports and Exercise* 1993;25(1):71-80. Adapted with technical assistance from Dr. Barbara Ainsworth.)

* The ratio of exercise metabolic rate. One MET is defined as the energy expenditure for sitting quietly, which, for the average adult, approximates 3.5 ml of oxygen uptake per kilogram of body weight per minute (1.2 kcal/min for a 70-kg individual). For example, a 2-MET activity requires two times the metabolic energy expenditure of sitting quietly.
+ For an average person, defined here as 70 kilograms or 154 pounds. The activity intensity levels portrayed in this chart are most applicable to men aged 30 to 50 years and women aged 20 to 40 years. For older individuals, the classification of activity intensity might be higher. For example, what is moderate intensity to a 40-year-old man might be vigorous for a man in his 70s. Intensity is a subjective classification.

Data for this chart were available only for adults. Therefore, when children's games are listed, the estimated intensity level is for adults participating in children's activities.
To compute the amount of time needed to accumulate 150 kcal, do the following calculation: 150 kcal divided by the MET level of the activity equals the minutes needed to expend 150 kcal. For example:

150 ÷3 METS = 50 minutes of participation. Generally, activities in the moderate-intensity range require 25-50 minutes to expend a moderate amount of activity, and activities in the vigorous-intensity range would require less than 25 minutes to achieve a moderate amount of activity. Each activity listed is categorized as light, moderate, or vigorous on the basis of current knowledge of the overall level of intensity required for the average person to engage in it, taking into account brief periods when the level of intensity required for the activity might increase or decrease considerably.

Persons with disabilities, including motor function limitations (e.g., quadriplegia) may wish to consult with an exercise physiologist or physical therapist to properly classify the types of physical activities in which they might participate, including assisted exercise. Certain activities classified in this listing as moderate might be vigorous for persons who must overcome physical challenges or disabilities.

~Note: Almost every occupation requires some mix of light, moderate, or vigorous activities, depending on the task at hand. To categorize the activity level of your own position, ask yourself: How many minutes each working day do I spend doing the types of activities described as light, moderate, or vigorous? To arrive at a total workday caloric expenditure, multiply the minutes spent doing activities within each intensity level by the kilocalories corresponding to each level of intensity. Then, add together the total kilocalories spent doing light, moderate, and vigorous activities to arrive at your total energy expenditure in a typical day.

Reprinted from the American Heart Association website:

American Heart Association (2009). Physical activities defined by level of intensity. Retrieved December 23, 2009, from http://www.heart.org/presenter.jhtml?identifier=3046917 .

Appendix B

READINESS FOR LIFESTYLE CHANGE INVENTORY

Read each question below and circle the answer below it (only one answer) that most applied to you before you had your heart surgery or cardiac event.

1. Have you ever smoked?
   a. Yes, but I quit ***more than 6 months ago***
   b. Yes, but I quit ***less than 6 months ago***
   c. Yes, and I intend to quit in the ***next month***
   d. Yes, and I intend to quit in the ***next 6 months***
   e. Yes, and I do **NOT** intend to quit in the ***next 6 months***
   f. No

2. Do you exercise regularly (that is, at least 3 times a week for at least 30 minutes)?
   a. Yes, and I have been for *more than 6 months*
   b. Yes, and I have been for *less* ***than 6 months***
   c. No, but I intend to start in the ***next month***
   d. No, but I intend to start in the ***next 6 months***
   e. No, and I do **NOT** intend to start in the ***next 6 months***

3. Have you been trying to lose weight?
   a. Yes, and I have been for *more than 6 months*
   b. Yes, and I have been for *less* ***than 6 months***
   c. No, but I intend to start in the ***next month***
   d. No, but I intend to start in the ***next 6 months***
   e. No, and I do **NOT** intend to start in the ***next 6 months***
   f. I do not need to lose weight as my weight is within a normal range for my height and frame

4. Do you consistently avoid eating a high fat diet?
   a. Yes, and I have been for *more than 6 months*
   b. Yes, and I have been for *less* ***than 6 months***
   c. No, but I intend to start in the ***next month***
   d. No, but I intend to start in the ***next 6 months***
   e. No, and I do **NOT** intend to start in the ***next 6 months***

5. Do you eat at least 4 to 5 servings of fruit and vegetables **everyday**?
   a. Yes, and I have been for *more than 6 months*
   b. Yes, and I have been for *less* ***than 6 months***
   c. No, but I intend to start in the ***next month***
   d. No, but I intend to start in the ***next 6 months***
   e. No, and I do **NOT** intend to start in the ***next 6 months***

6. Do you practice a relaxation technique regularly (that is, at least 10 minutes daily, 6 days/week)?
    a. Yes, and I have been for *more than 6 months*
    b. Yes, and I have been for *less* ***than 6 months***
    c. No, but I intend to start in the ***next month***
    d. No, but I intend to start in the ***next 6 months***
    e. No, and I do **NOT** intend to start in the ***next 6 months***

KEY FOR DETERMINING STAGE OF CHANGE

The answer selected for each question in the tool has the following stage of change assigned to it:

a = Maintenance

b = Action

c = Preparation

d = Contemplation

e = Precontemplation

f = not applicable (*questions #1 and #3*)

Appendix C

Self-efficacy (Barriers) to Exercise

How confident are you right now that you could exercise 3 times per week for 20 minutes if:

	Not Confident										Very Confident
1. you worried the exercise would cause further pain	0	1	2	3	4	5	6	7	8	9	10
2. you were bored by the program or activity	0	1	2	3	4	5	6	7	8	9	10
3. you were not sure exactly what exercises to do	0	1	2	3	4	5	6	7	8	9	10
4. you had to exercise alone	0	1	2	3	4	5	6	7	8	9	10
5. you did not enjoy it	0	1	2	3	4	5	6	7	8	9	10
6. you were too busy with other activities	0	1	2	3	4	5	6	7	8	9	10
7. you felt tired during or after exercise	0	1	2	3	4	5	6	7	8	9	10
8. you felt stressed	0	1	2	3	4	5	6	7	8	9	10
9. you felt depressed	0	1	2	3	4	5	6	7	8	9	10
10. you were afraid the exercise would make you fall	0	1	2	3	4	5	6	7	8	9	10
11. you felt pain when exercising	0	1	2	3	4	5	6	7	8	9	10

Appendix D

LIFESTYLE PROFILE II
Physical Activity & Interpersonal Relations Subsets

DIRECTIONS: This questionnaire contains statements about your present way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by circling:

N for never, **S** for sometimes, **O** for often, or **R** for routinely

		NEVER	SOMETIMES	OFTEN	ROUTINELY
1.	Discuss my problems and concerns with people close to me.	**N**	**S**	**O**	**R**
2.	Follow a planned exercise program.	**N**	**S**	**O**	**R**
3.	Praise other people easily for their achievements.	**N**	**S**	**O**	**R**
4.	Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).	**N**	**S**	**O**	**R**
5.	Maintain meaningful and fulfilling relationships with others.	**N**	**S**	**O**	**R**
6.	Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 or more times a week).	**N**	**S**	**O**	**R**
7.	Spend time with close friends.	**N**	**S**	**O**	**R**
8.	Take part in leisure-time (recreational) physical activities dancing, (such as swimming, bicycling).	**N**	**S**	**O**	**R**
9.	Find it easy to show concern, love and warmth to others.	**N**	**S**	**O**	**R**
10.	Do stretching exercise at least 3 times per week.	**N**	**S**	**O**	**R**
11.	Touch and am touched by people I care about.	**N**	**S**	**O**	**R**

(Continued on next page)

		NEVER	SOMETIMES	OFTEN	ROUTINELY
12.	Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car away from destination and walking).	**N**	**S**	**O**	**R**
13.	Find ways to meet my needs for intimacy.	**N**	**S**	**O**	**R**
14.	Check my pulse rate when exercising.	**N**	**S**	**O**	**R**
15.	Get support from a network of caring people.	**N**	**S**	**O**	**R**
16.	Reach my target heart rate when exercising.	**N**	**S**	**O**	**R**
17.	Settle conflicts with others through discussion and compromise.	**N**	**S**	**O**	**R**

Appendix E

ENRICHD Social Support Instrument

Is there someone available whom you can count on to listen to you when you need to talk?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

Is there someone available to you to give you good advice about a problem?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

Is there someone available to you who shows you love and affection?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

Is there someone available to help with daily chores?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

Can you count on anyone to provide you with emotional support (e.g., talking over problems or helping you make a difficult decision)?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

Do you have as much contact as you would like with someone you feel close to, someone whom you can trust and in whom you can confide?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐	☐	☐	☐	☐

Are you currently married or living with a partner?

Yes	No
☐	☐

Public Domain (see Appendix L):

Mitchell, P., Powell, L., Blumenthal, J., Norten, J., Ironson, G., Pitula, C., et al. (2003). A short measure for patients recovering from MI: the ENRICHD social support inventory. *Journal of Cardiopulmonary Rehabilitation*, 23(6), 398-403.

Appendix F

SUBJECT #_____

From the Medical Record:

Age	Gender	Race/Ethnicity	Marital Status

Diagnosis/Surgery	Ejection Fraction (%)

Highest Level of Education	Baseline Functional Assessment (Metabolic Equivalents)

1. Number of major vessels stenosed:……_____
2. Subject's weight (round to nearest kg)……_____
3. Subject's height (round to nearest cm)……_____
4. Subject's BP (earliest recorded measure during hospitalization)……_____
5. Subject's HR (earliest recorded measure during hospitalization……_____
6. Does the subject have a history of the following? (Check items that apply):

    A. Cardiac arrhythmia…….._____
    B. Valve problem……_____
    C. Myocardial Infarction……_____
    D. Heart Failure……..._____
    E. Peripheral Artery Disease……..._____
    F. Congenital heart disease……...…….._____
    G. Rheumatic heart disease……_____
    H. Preoperative cardiac arrest……_____
    I. Diabetes mellitus……_____
    J. Cerebral Vascular Accident……...._____
    K. Arthritis……_____
    L. Cancer……....._____
    M. Alcoholism……_____
    N. Chronic lung disease……....._____
    O. Post-op complications – _____

P. Other – _____

7. Medications on discharge (Check all that apply):
   A. Bronchodilator……..____
   B. Antianxiety……____
   C. Antidepressant……...____
   D. Sulfonylurea……...____
   E. Insulin……____
   F. Antiplatelet agent……...____
   G. Coumadin……...____
   H. Diuretic……...____
   I. Beta-blocker……____
   J. Calcium channel blocker……____
   K. Angiotensin converting enzyme (ACE) inhibitor……...____
   L. Non-thiazide, Non-ACE antihypertensive……..____
   M. Vasodilator……____
   N. Digoxin……..____
   O. Antidysrhythmic……____
   P. Analgesic……____
   Q. Lipid lowering……____
   R. Antibiotic……____
   S. H-2 blocker……____
   T. Other – _____

8. Subject was discharged to (Circle appropriate answer): Home Rehab Nsg. Home

From the Subject (interview prior to starting cardiac rehabilitation):

1. How many city blocks or their equivalent did you regularly walk each day prior to your cardiac event?
   _____blocks/day (Let 12 blocks = 1 mile)

2. What was your usual pace of walking? (Please check one):

[ ]1	[ ]2	[ ]3	[ ]4
Casual or Strolling (<2 mph)	Average or normal (2 – 3 mph)	Fairly brisk (3 – 4 mph)	Brisk or striding (4 mph or >)

3. How many flights of stairs did you climb up each day? _____flights/day (Let 1 flight = 10 steps)
4. Did you actively participate in any sports or recreation this past year? (Seasonal sports or events) _____Yes _____No

5. At least once a week, did you engage in regular activity akin to brisk walking, jogging, bicycling, swimming, etc. long enough to work up a sweat, get your heart thumping, or get out of breath?
   NO [ ]1 Why not?_____
   YES [ ]2 How many times per week?_____Activity:_____

6. When you exercised in your usual fashion, how would you rate your level of exertion (degree of effort)?

0	0.5	1	2	3	4	5	6	7	8	9	10
Nothing at all	Very very weak	Very weak	Weak	Mod	Some-what strong	Strong (heavy)		Very strong			Very very strong

Exit Interview (by phone or in cardiac rehab) & Information from Medical Record:

1. Did you participate in cardiac rehabilitation?
   YES [ ]1 NO [ ]2
   (If "yes", skip to #3)

2. Why not? _____

3. How long did you participate in the program?_____

4. How often did you attend?_____

5. What activities did you participate in during this program?_____

6. % of Cardiac Rehab goals met in program:_____

7. In general, would you say your health before your cardiac event was:
   [ ]5 [ ]4 [ ]3 [ ]2 [ ]1
   Excellent Very Good Good Fair Poor

8. In general, would you say your health RIGHT NOW is:
   [ ]5 [ ]4 [ ]3 [ ]2 [ ]1
   Excellent Very Good Good Fair Poor

9. In general, do you EXPECT your health IN THE NEXT SIX MONTHS to be:
   [ ]5 [ ]4 [ ]3 [ ]2 [ ]1
   Excellent Very Good Good Fair Poor

Dates:_____
Recruited D/C Hosp. Began Phase II Exit/Drop Out

SUBJECT #_____

From the Phase II Cardiac Rehab Record:

1. Baseline met level: _____
2. Met level goal: _____
3. Met level achieved: _____
4. % met level goal achieved: _____
5. Did subject complete the program?
   YES [ ]1 NO [ ]0

Appendix G

SCRIPT TO BE READ TO PATIENT BY NURSE

- A registered nurse employed by United Hospital who is also a doctorate student from the University of Minnesota would like to speak to you about possibly participating in a study she is conducting for her dissertation.

- Her study is entitled "Probabilities and Predictors for Participation in a Cardiac Rehabilitation Program" where she will be collecting information from patients in order to answer the research questions regarding completion of a cardiac rehabilitation program.

- You have been chosen as a possible study participant because you have had a cardiac event and your doctor has just written orders for you to receive cardiac rehabilitation.

- The study will involve a short interview followed by a survey regarding exercise habits, attitudes towards exercise, and other lifestyle activities. This could take up to 30 minutes to complete. Other than this, you will not be required to do anything further.

- Some of the risks involved in participating may involve an invasion of privacy in relation to some of the questions posed and there will be an imposition of your time. If at any time you feel uncomfortable answering any questions, you may withdraw from the study without any repercussions to you.

- All answers and forms will be kept confidential and you will only be identified by a number. Any published information will not be able to identify you as an individual who participated in the study. All data will be kept in a locked file and any electronic data will be stored in a secured computer file that only she has access to.

- Will you allow her to come into your room to speak with you more about the study?

  ☐ **Yes** ☐ **No**

Appendix H

Research Subject's Bill of Rights:

People who volunteer to participate in an experiment (also called a research study or clinical trial) need to understand what is expected of them and why the research is being done. As you think about whether or not to volunteer, it is important that you know you have rights in place to help protect you. These rights, listed below, will be further explained as you read this informed consent document.

If you are asked to participate in a research study, you have the right to:

- be told the purpose and details of the research study,
- have the drugs or devices (tools or pieces of equipment) used in the research study described,
- have the procedures of the research study and what is expected of you explained,
- have the risks, dangers and discomforts of the research study described,
- have the benefits and advantages of the research study described,
- be told of other drugs, devices or procedures (and their risks and benefits) that may be helpful to you,
- be told of medical treatment available to you should you be injured because of the research study,
- have a chance to ask questions about the research study,
- quit the research study at any time without it affecting your future treatment,
- have enough time to decide whether or not to take part in this research study

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Appendix I

CONSENT FORM

Protocol Title: Probabilities and Predictors for Participation in a Cardiac Rehabilitation Program

Investigator: Kathryn A. Krisko-Hagel, PhD(c), RN

Conflict of Interest Statement: This study will not be receiving funding from any source for cost related to conducting the study.

Subject Selection: You were selected as a possible study subject because you have undergone a cardiac surgical procedure (coronary artery bypass graft surgery or cardiac valve replacement surgery) and have received a physician's order to attend a cardiac rehabilitation program

Study Purpose: The purpose of the study is to (1) determine if stage of readiness to begin an exercise is associated with length of time participating in a cardiac rehabilitation program; (2) determine if level of self-efficacy to begin a cardiac rehabilitation program can predict the length of time an individual will remain in the rehab program; and (3) determine if perceived benefits or barriers of participating in cardiac rehabilitation is associated with meeting cardiac rehab goals and/or length of time in the rehab program.

Size of Study: ~60 subjects will be enrolled in the study.

Study Procedures and Duration: If you agree to participate in this study, you will be asked to do the following: be involved in a short interview by the principle investigator answering 6 questions and to fill out a questionnaire that could take up to 30 minutes to complete. You may be asked to complete this same questionnaire in 6 weeks and, again, at 12 weeks.

Risks and Discomforts:

- The study has the following risk(s): Some of the questions in any of the questionnaires that discuss certain health behaviors or lack of healthy lifestyle practices could potentially cause some mental or emotional distress for particular individuals tending to personalize what may be implied within each question. Also, there is an imposition of time (approximately 30 minutes) and a possible invasion of privacy.

- There are no other known risks. However, there may be unforeseeable risks that have not yet been identified.

Benefits of Study Participation:

- There may or may not be direct medical benefit to you. We hope the information learned from this study will benefit other patients with your condition in the future.

Alternatives to Study Participation:

- Your alternative is not to participate in this study.

Costs:

- There is no cost to you to participate in this research study.

Compensation:

- You will not be paid for participating in this study.

Compensation for Research-Related Injury: In the event that your participation in this research study results in an injury, treatment will be available, including first aid, emergency treatment and follow-up care, as needed. Care for such injuries will be billed in the ordinary manner to you or your insurance company.

Confidentiality: Every effort will be made to be sure that your participation in this study, and all records of your participation, will remain confidential. However, confidentiality cannot be absolutely guaranteed. Due to the nature of the research study oversight, some regulatory agencies may have the right to review the records of this study. These include*:* the University of Minnesota and Allina Institutional Review Boards.

- No information that could identify you, such as names, address or Social Security number, will be used when the results of this study are published or presented.

- Patient data transmitted over the Internet will be encrypted. (This means that it is very difficult for an unauthorized person to see this information.) The utmost of care will be taken to make sure all patient data contained in the study is secure.

Voluntary Participation: Participation in this study is voluntary. Your decision as to whether or not to participate in this study will not affect your current or future care with the University of Minnesota or at United Hospital (Allina).

Right to Withdraw: You may withdraw from the study at any time. Your decision not to take part in or to withdraw from this study will not involve any penalty or lost benefits to which you are entitled, and will not affect your access to health care at United Hospital. If you do decide to withdraw, we ask that you contact Kathryn A. Krisko-Hagel at United Hospital, Education Services, 333 North Smith Avenue, Saint Paul, MN 55102 to let her know that you are withdrawing from the study.

Termination: The principle investigator, the Allina Review Board, or the University of Minnesota Review Board may discontinue your participation in the study without your consent if they feel that it is in your best interest or if you fail to comply with the study procedures, experience a study-related injury, unacceptable side effects or for administrative reasons.

New Findings: If we find out new information during the course of the study that may change your willingness to continue (for example, a new, serious side effect), we will contact you.

Contacts and Questions: The researcher conducting this study is Kathryn A. Krisko-Hagel. You may ask any questions you have now, or if you have questions later, you are encouraged to contact her at 651-241-8216 or 651-686-6182.

If you have any questions about your rights as a research subject, or complaints about this research study, please direct them to the Allina Institutional Review Board Administrative Office at 612-262-4920.

You will be given a copy of this form and a copy of the Research Subject's Bill of Rights.

Statement of Consent:
I have had the opportunity to ask questions and have had my questions answered. I have been given enough time to consider participating. I agree to participate.

_____
Printed name of subject

_____ _____
Signature of subject Date

_Kathryn A. Krisko-Hagel, PhD(c), RN_____ Principle Investigator____
Printed name of person obtaining consent Role in study

_____ _____
Signature of person obtaining consent Date

Approved: November 29, 2005

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Appendix J

HIPAA Authorization for the Use & Disclosure of PHI

Probabilities and Predictors for Participation in a Cardiac Rehabilitation Program

Patient's Name: _____

Use and Disclosure of Your Medical Information
By signing this form, you are authorizing the use and disclosure of your private health information in connection with your participation in this research study. Your information will only be used in accordance with the provisions of this authorization and any other disclosure laws that we may be required to follow.

What Information Will Be Used or Disclosed?
Your health information related to this study, including, but not limited to: age, gender, race/ethnicity, diagnosis, ejection fraction, marital status, existence of any co-morbidities, and baseline functional ability as assessed by the cardiac rehabilitation staff may be used or disclosed in connection with this research study.

Who May Use or Disclose the Information
The following parties are authorized to use and/or disclose your health information in connection with this research study:

- Name of Investigator: Kathryn A. Krisko-Hagel, PhD(c), RN
- Name of IRB: Allina Institutional Review Board and the University of Minnesota Institutional Review Board
- Hospital: United Hospital

Who May Receive/Use the Information?
The parties listed in the preceding paragraph may disclose your health information to the following persons and organizations for their use in connection with this research study:

- The Office for Human Research Protections in the U.S. Department of Health and Human Services
- University of Minnesota

Your information may be redisclosed if the recipients described are not required by law to protect the privacy of the information.

Expiration
Your authorization for the use and/or disclosure of your health information will expire upon completion of the research study.

When Access to Your Information May Be Limited
You may not be allowed to see or copy certain information in your medical or study records collected in connection with your participation in this research study while the research is in progress. However, your right to access your medical records may be available to you or to medical professionals caring for you.

Revocation
If you decide to terminate your participation in the study, or if you are removed from the study by the principal investigator, you may revoke your authorization to obtain your private health information. To end your authorization, you must notify Kathryn A. Krisko-Hagel in writing at United Hospital, Education Services, 333 North Smith Avenue, Saint Paul, MN 55102. However, information that has already been collected cannot be removed from the study or medical records.

Signature

Signature of Study Participant	Date

Approved: November 29, 2005

Appendix K

Gender Differences in Social Support & Marital Status

Subject #	Gender	Marital Status	Social Support
1	M	M	23
2	M	D	8
3	M	M	25
4	M	S	24
5	F	D	17
6	M	M	19
7	M	M	25
8	M	M	18
9	F	S	17
11	M	M	21
12	M	M	19
13	F	W	14
14	M	M	17
15	M	D	21
16	M	M	20
17	M	M	25
18	M	M	14
19	M	M	19
21	M	M	24
22	F	W	17
23	F	M	20
24	M	D	24
26	M	M	25
27	M	M	24
28	F	M	20
29	M	M	24
30	M	M	23

Appendix L

Permission and Approval Letters

Research Subjects Protection Program
Institutional Review Boards
PO Box 43
Internal Mail Route 10105
Minneapolis, MN 55440-0043
612-262-4920
Fax 612-262-4059

November 19, 2008

ALLINA
Hospitals & Clinics

Kathryn Krisko-Hagel
4758 Ridge Wind Trail
Eagan, MN 55122

Re: **2530-4E**
Possible Predictors of Post-Cardiac Surgical Patients Most at Risk of Not Completing a Cardiac Rehabilitation Program

Dear Ms. Krisko-Hagel,

Thank you for your letter dated November 4, 2008, revised IRB application, revised consent form, and revised staff script in response to the stipulations of the United Hospital Institutional Review Board (IRB) as described in my letter of October 27, 2008. The requested corrections and clarifications have been made; therefore, you are now fully approved and may start to screen and enroll participants into the above referenced study. This final approval applies to consent form received November 6, 2008. A copy of the consent form bearing the Institutional Review Board (IRB) approval stamp is enclosed for your records. Please use a copy of the consent form bearing the IRB approval when obtaining signatures for consent. The IRB file number has also been stamped on the upper right hand corner of the consent form.

If this study must be reviewed by Allina Sponsored Projects you may not begin this research until their requirements have also been met.

Please inform the IRB immediately of any changes or modifications to the protocol, consent form or supporting documents prior to initiation. This includes protocol amendments, changes in the number of participants, etc. In addition, all subjects enrolled must fulfill all inclusion/exclusion criteria; any exceptions must have prior approval from the IRB. You must notify the IRB if any participants experience serious adverse events or events that occur at a frequency or intensity greater than that described in the approved consent form.

It is your responsibility to submit an annual Continuing Review Form to this office. Your study must be renewed on or before October 26, 2009. The Continuing Review Form is available on the Allina web site at http://www.allina.com/ahs/research.nsf/page/forms. If your study has been completed or terminated prior to that date, please submit a final summary of your project in addition to the Continuing Review Form.

In any future correspondence with the IRB, please refer to the assigned study number, the principal investigator's name and the name of the board that reviews this study.

On behalf of the IRB I wish you success with your research. If you have any questions or concerns, please call the IRB administrative office at (612) 262-4920.

Sincerely,

Ann Marie Dickson
Compliance Specialist

Subject: **final approval letter**

From: irb@umn.edu

Date: Tue, 2 Dec 2008 14:47:38 -0600 (CST)

To: kris0056@umn.edu

12/02/2008

Katie A Krisko-Hagel
WDH Room 6-152
308 Harvard Street SE
Minneapolis, MN 5555455

RE: "Probabilities and Predictors for Participation in a Cardiac Rehabilitation Program"
IRB Code Number: 0808P45403

Dear Ms. Krisko-Hagel

The Institutional Review Board (IRB) received your response to its stipulations. Since this information satisfies the federal criteria for approval at 45CFR46.111 and the requirements set by the IRB, final approval for the project is noted in our files. Upon receipt of this letter, you may begin your research.

IRB approval of this study includes the consent form received November 25, 2008.

The IRB would like to stress that subjects who go through the consent process are considered enrolled participants and are counted toward the total number of subjects, even if they have no further participation in the study. Please keep this in mind when calculating the number of subjects you request. This study is currently approved for 80 subjects. If you desire an increase in the number of approved subjects, you will need to make a formal request to the IRB.

For your records and for grant certification purposes, the approval date for the referenced project is September 28, 2008 and the Assurance of Compliance number is FWA00000312 (Fairview Health Systems Research FWA00000325, Gillette Children's Specialty Healthcare FWA00004003). Research projects are subject to continuing review and renewal; approval will expire one year from that date. You will receive a report form two months before the expiration date. If you would like us to send certification of approval to a funding agency, please tell us the name and address of your contact person at the agency.

As Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should not be initiated until written IRB approval is received. Unanticipated problems or serious unexpected adverse events should be reported to the IRB as they occur.

The IRB wishes you success with this research. If you have questions, please call the IRB office at 612-626-5654.

Sincerely,

Felicia Mroczkowski, CIP
Research Compliance Supervisor
FM/egk
CC: Ruth Lindquist

University of Nebraska Medical Center

COLLEGE OF NURSING
Community-Based Health Department

985330 Nebraska Medical Center
Omaha, NE 68198-5330
402/559-6362
Fax: 402/559-6379

Dear Colleague:

Thank you for your interest in the *Health-Promoting Lifestyle Profile II*. The original *Health-Promoting Lifestyle Profile* became available in 1987 and has been used extensively since that time. Based on our own experience and feedback from multiple users, it was revised to more accurately reflect current literature and practice and to achieve balance among the subscales. The *Health-Promoting Lifestyle Profile II* continues to measure health-promoting behavior, conceptualized as a multidimensional pattern of self-initiated actions and perceptions that serve to maintain or enhance the level of wellness, self-actualization and fulfillment of the individual. The 52-item summated behavior rating scale employs a 4-point response format to measure the frequency of self-reported health-promoting behaviors in the domains of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations and stress management. It is appropriate for use in research within the framework of the Health Promotion Model (Pender, 1987), as well as for a variety of other purposes.

The development and psychometric evaluation of the English and Spanish language versions of the original instrument have been reported in:

Walker, S. N., Sechrist, K. R., & Pender, N. J. (1987). The Health-Promoting Lifestyle Profile: Development and psychometric characteristics. Nursing Research, 36(2), 76-81.

Walker, S. N., Volkan, K., Sechrist, K. R., & Pender, N. J. (1988). Health-promoting lifestyles of older adults: Comparisons with young and middle-aged adults, correlates and patterns. Advances in Nursing Science, 11(1), 76-90.

Walker, S. N., Kerr, M. J., Pender, N. J., & Sechrist, K. R. (1990). A Spanish language version of the Health-Promoting Lifestyle Profile. Nursing Research, 39(5), 269-273.

A copy of the instrument (English and Spanish versions), scoring instructions, an abstract of the psychometric findings, and a list of publications reporting research using all versions of the instrument are available for download.

Sincerely,

Susan Noble Walker, EdD, RN, FAAN
Professor Emeritus

Krisko-Hagel, Katie A

From: Pamela H. Mitchell [pmitch@u.washington.edu]
Sent: Tuesday, December 15, 2009 12:06 PM
To: Krisko-Hagel, Katie A
Subject: RE: Request

Congratulations on your study and the completion of your PhD. Since our tool was developed with NIH funding, it is in the public domain and you can feel free to include it in your appendices. I would recommend that you include the scoring algorithm as well. I think you should indicate in the appendix that it is in the public domain (rather than copyrighting it), citing the 2003 JCR paper: Mitchell, P.H., Powell, L., Blumenthal, J., Norten, J., Ironson, G., Pitula, C.R., Froelicher, E.S., Czajkowski, S., Youngblood, M., Huber, M., & Berkman, L.F. (2003).Development And Validation Of A Short Social Support Measure In Patients Recovering From Myocardial Infarction: The ENRICHD Social Support Inventory. Journal of Cardiopulmonary Rehabilitation , *23(6)*, 398-403.

My colleagues and I appreciate that you have taken the time to let us know of its usefulness to you.

Congratulations to you again.

Pamela H. Mitchell, PhD, RN, FAHA, FAAN
Professor and Associate Dean for Research, School of Nursing
Adjunct Professor, Health Services, School of Public Health & Community Medicine
Director, Center for Health Sciences Interprofessional Education
University of Washington, Box 357266
Seattle WA 98195-7266
206-685-1525, FAX 206-685-9264 (Harborview office 206-744-3303)

From: Krisko-Hagel, Katie A [mailto:Katie.Krisko-Hagel@allina.com]
Sent: Tuesday, December 15, 2009 5:23 AM
To: Pamela H. Mitchell
Subject: Request

Dear Dr. Mitchell,

I am a PhD candidate in nursing from the University of Minnesota. I am currently completing the requirements for my doctoral degree (dissertation and defense) this month. My study is entitled, "Predictors for Participation in a Cardiac Rehabilitation Program Feasibility Study." My study included men and women who have either undergone heart surgery (valve replacement or coronary bypass) or suffered a heart attack and had treatment in a cardiac catheterization lab. I recruited my subjects once they had received orders from their physicians to attend cardiac rehabilitation. My study was hoping to be able to idenify ways to predict those at highest risk of not completing the program so that effective interventions could be developed to help this group of people attain more positive outcomes.

One of the tools I used for my data collection was the "ENRICHD Social Support

Inventory" (developed by you and your colleagues) which my advisor, Ruth Lindquist, PhD, RN suggested. I had very favorable results measuring social support as a possible predictor for successful completion of the cardiac rehab program. I am writing to you at this time to request your permission to include this tool in the appendix of my dissertation. I have cited you and your colleagues in my dissertation and I plan to attach a copyright to your names on the tool in my appendix.

Feel free to contact me via email or to my home address:

4758 Ridge Wind Trail

Eagan, Minnesota 55122

I look forward to hearing from you regarding this request. Thank you for helping me to complete my PhD in nursing degree.

Sincerly,

Kathryn A. Krisko-Hagel

The Miriam Hospital
A Lifespan Partner

Date: July 15, 2008

To: Kathryn A. Krisko-Hagel, MS, RN
Learning & Development Specialist
Education Services at United Hospital
333 North Smith Avenue
St. Paul, Minnesota 55102

Dear Kathryn,

Thank you for your interest in my work. Below you will find a list of articles that you can refer to for specific information about questionnaires, scoring, and reliability and validity. Also listed below are several articles about our interventions to promote physical activity.

I would also like to refer you to my book entitled, *Motivating People to Be Physically Active*, which is published by Human Kinetics and available at www.humankinetics.com as well as most university libraries. It includes all the measures I have developed along with their theoretical foundations and scoring. It also includes information on conducting interventions with various populations.

This letter grants you permission to use my measures, questionnaires, and scoring keys for research purposes only. I only request that in any presentation, manuscript, or written material, the original instruments should be cited appropriately. Good luck with your research. I wish you much success!

Marcus, B. H., Lewis, B. A., Williams, D. M., Dunsiger, S. I., Jakicic, J. M., Whiteley J.A., et al (2007). A comparison of internet and print-based physical activity interventions. Archives of Internal Medicine, 167(9), 944-949.

Marcus, B. H., Napolitano, M. A., Lewis, B. A., King, A. C., Whiteley, J. A., Albrecht, A. E., Parisi, A. F., Pinto, B. M., Bock, B. C., Sciamanna, C. A., Jakicic, J. M., & Papandonatos, G. D. (2007). Examination of print and telephone channels for physical activity promotion: Rationale, design, and baseline data from project STRIDE. Contempory Clinical Trials, 28(1), 90-104.

Marcus, B. H., Napolitano, M. A., King, A. C., Lewis, B. A., Whiteley, J. A., Albrecht, A. E., Parisi, A. F., Bock, B. C., Pinto, B. M., Sciamanna, C., Jakicic, J. M., & Papandonatos, G. D. (2007). Telephone versus print delivery of an individualized motivationally-tailored physical activity intervention: Project STRIDE. Health Psychology, 26(4), 401-409.

Marcus, B. H., Bock, B.C., Pinto, B.M., Forsyth, L.H., Roberts, M.B., & Traficante, R.M. (1998). Efficacy of an individualized, motivationally-tailored physical activity intervention. Annals of Behavioral Medicine, 20(3), 174-180.

Marcus, B.H., Emmons, K.M., Simkin-Silverman, L.R., Linnan, L.A., Taylor, E.R., Bock, B.C., Roberts, M.B., Rossi, J.S., & Abrams, D.B. (1998). Evaluation of motivationally tailored vs. standard self-help physical activity interventions at the workplace. American Journal of Health Promotion, 12, 246-253.

Marcus, B.H., & Simkin, L.R. (1993). The stages of exercise behavior. The Journal of Sports Medicine and Physical Fitness, 33, 83-88.

Marcus, B.H., Banspach, S.W., Lefebvre, R.C., Rossi, J.S., Carleton, R.A., & Abrams, D.B. (1992). Using the sages of change model to increase the adoption of physical activity among community participants. American Journal of Health Promotion, 6, 424-429.

Marcus, B.H., Rakowski, W., & Rossi, R.S. (1992). Assessing motivational readiness and decision-making for exercise. Health Psychology, 11, 257-261.

Marcus, B.H., Rossi, J.S., Selby, V.C., Niaura, R.S. & Abrams, D.B. (1992). The stages and processes of exercise adoption and maintenance in a worksite sample. Health Psychology, 11, 386-395.

Marcus, B.H., Selby, V.C., Niaura, R.S., & Rossi, J.S. (1992). Self-efficacy and the stages of exercise behavior change. Research Quarterly for Exercise and Sport, 63, 60-66.

Again, thank you for your interest.

Sincerely,

Bess H. Marcus, Ph.D.
Professor of Community Health and Psychiatry & Human Behavior
Director, Centers for Behavioral & Preventive Medicine
Brown Medical School and The Miriam Hospital

Krisko-Hagel, Katie A

From: Resnick, Barbara M. [Resnick@son.umaryland.edu]
Sent: Monday, December 21, 2009 8:38 PM
To: Krisko-Hagel, Katie A
Subject: RE: Request from a Colleague

Oh honey if you learn nothing from your dissertation work ...learn that science is to be shared. Do whatever you would like with that measure. SO.....more importantly what did you find?????
Barbara Resnick, PhD,CRNP, FAAN,FAANP
Professor
University of Maryland School of Nursing Sonya Ziporkin Gershowitz Chair in Gerontology

—Original Message—
From: Krisko-Hagel, Katie A [mailto:Katie.Krisko-Hagel@allina.com]
Sent: Mon 12/21/2009 1:10 PM
To: Resnick, Barbara M.
Subject: RE: Request from a Colleague

Dear Dr. Resnick,

It has been awhile since I last wrote to you regarding a tool you helped to develop - "Self-Efficacy for Exercise Scale" (see below). The tool worked out remarkably well. I have successfully defended my dissertation and am in the process of putting the final touches to it before it is electronically filed in the University of Minnesota's database. I am writing to request permission to include this tool in the appendix of my dissertation. It will have the copyright symbol with the names of all authors and the year. If you do not want me to include this in the appendix, I will remove it without question.

Thank you!

Katie

"A successful person is one who can lay a firm foundation with the bricks that others throw at him" ~ David Brink
****

Kathryn A. Krisko-Hagel, PhD, RN
Sr. Learning & Development Specialist
Allina Center for Learning & Innovation
Allina Commons - Allina Hospitals & Clinics
2925 Chicago Avenue South
Minneapolis, Minnesota 55407-1321
Mail Stop# 10701 Phone: 612-262-5037
Pager: 612-654-3344 Fax: 612-262-5050
email: katie.krisko-hagel@allina.com