1998

The Relationship of Selected Health Beliefs and Exercise Adherence 6-12 Weeks Post Cardiac Event

Kristi L. Bianconi
Grand Valley State University

THE RELATIONSHIP OF SELECTED HEALTH BELIEFS AND EXERCISE ADHERENCE 6-12 WEEKS POST CARDIAC EVENT

By

Kristi L. Bianconi

A THESIS

Submitted to
Grand Valley State University
in partial fulfillment of the requirements for the
degree of

MASTER OF SCIENCE IN NURSING

Kirkhof School of Nursing

1998

Thesis Committee Members:

Charlotte Torres, Ed.D., R.N., C.S.

Jim Scott, P.E.S.

Ronald L. VanderLaan, M.D., FACP, FACC

ABSTRACT

THE RELATIONSHIP OF SELECTED HEALTH BELIEFS AND EXERCISE ADHERENCE 6-12 WEEKS POST CARDIAC EVENT

By

Kristi L. Bianconi

The hypothesis tested in this study was: Perceived benefits, barriers, and self-efficacy of individuals who are adherent to a cardiac exercise program will differ from individuals who are non-adherent. The study was a descriptive, correlational design using the Health Belief Model. Data were collected from 25 subjects, recruited from a private cardiology practice who participated in a cardiac rehabilitation program 6 to 12 weeks post hospitalization for a coronary event, defined as angina pectoris, myocardial infarction, coronary angioplasty or stenting, or coronary artery bypass grafting.

Measurement of subject's responses to perceived benefits, barriers and self-efficacy were collected through mailed questionnaires. Statistical analysis of data did not produce significant differences and did not support the working hypothesis. Recommendations include a larger sample size, longitudinal studies, and comparison of difference in adherence rates based on diagnoses.

This is dedicated to every nurse, wife and mother who struggles against the odds – an inspiration to persevere.

Acknowledgments

Sincere appreciation goes to Charlotte Torres, Ed.D., R.N., C.S. for her constant encouragement, unending helpfulness and understanding of my challenges. She has helped me keep the goals of this project in perspective, all the while nudging me onward.

Linda Scott, R.N., M.S.N., showed infinite patience during the data analysis process. She reminded me of the purpose of the project, and lifted my spirits at a time when I was overwhelmed.

Appreciation also goes to Dr. Ronald L. VanderLaan and Prof. James Scott, P.E.S. for their willingness to take valuable time to be a part of the committee and evaluation process.

I thank Katherine Kim, R.N., Ph.D., for her gentle strength, her thorough yet kind critiques, her generosity and her willingness to pull me along at a time when I would have rather quit. Katherine always provided words of encouragement, and went out of her way to smooth the path.

I extend sincere gratitude to Mary Horan, R.N., Ph.D., my original thesis chair. Through many of life's adventures I encountered during this project, Mary was there to understand the challenge, feel the pain, provide encouragement, and be my advocate. Without her assistance, this project could not have been completed.

My greatest appreciation goes to my husband Bill, daughters Elise and Brianna, and my extended family. Bill's constant encouragement and willingness to sacrifice has

been instrumental in my attainment of this goal. Elise and Brianna have shown me the true meaning of unconditional love while my time with them was diminished. My entire family, especially my mother, has provided unending inspiration, support and encouragement as I have reached for and now completed my goal.

Table of Contents

List of Tables

List of Appendices

CHAPTER I

INTRODUCTION

Coronary artery disease (CAD) is recognized as the leading cause of death among men and women in the United States affecting more than 13,900,000 individuals per year. CAD resulted in over 1,100,000 myocardial infarctions and 500,000 deaths in 1995 (American Heart Association, 1998). Individuals with CAD must deal with the debilitation of the disease, knowing that it is a progressive and chronic disease without a cure. The economic burden in the United States from CAD is estimated to cost between 50 and 100 billion dollars per year for medical treatment and lost wages (National Cholesterol Education Program, 1993). While CAD can be manifest in several ways, for the purposes of this study CAD will refer to angina pectoris, myocardial infarction and atherosclerotic lesions within the coronary arteries.

Treatment for individuals with CAD has been aimed at preventative interventions and risk factor modifications including smoking cessation, lowering blood pressure, lipid management, dietary change, weight control, and increasing physical exercise. Oldridge (1991) conducted a meta-analysis of ten studies and found that post myocardial infarction (MI) patients who participated in a cardiac rehabilitation program had a 25% reduction in fatal events. Sytkowski, Kannel, and D'Agostino (1990) reported a strong correlation between the decline in deaths from cardiovascular disease and an improved risk factor

status. LaFontaine (1995) reviewed nine studies conducted since 1992 which suggested that prevention, stabilization, or regression of coronary atherosclerosis in patients with documented CAD may be achieved with intensive therapy directed at diet, exercise and stress.

The most commonly prescribed method to assist with risk factor modification post cardiovascular event is a cardiac rehabilitation (CR) program. Modification means patients must face or undergo many physical and psychological adjustments that are often very difficult to accomplish. Patient adherence to prescribed medical recommendations has been a persistent challenge for health professionals. Becker (1985) reported that only one third of patients adhere to prescribed treatment plans. Comoss (1988) and Oldridge (1991) reported the dropout rate for CR programs to be 40-60%. In two studies of cardiac rehabilitation for patients age 65 and older, Hellman (1997) reported a dropout rate of 50% in the first 3-6 months. Ades, Waldmann, McCann and Weaver (1992) reported an initial participation rate of only 21% in the same age group.

Nurses and other health team members have the responsibility of reinforcing the medical treatment plan. Education through CR programs attempts to affect attitude and behavior changes that will reinforce preventative behaviors and reduce the risk of premature mortality. Adherence to specific behaviors is partially determined by the patient's attitude toward the behavior and the perceived benefit. Critical for the development of effective interventions is understanding what determines those behaviors. One way to achieve a better understanding of an individual's adherence to treatment plans

is to consider the psychological variables that affect health behaviors (Becker, 1974).

Past research has identified the Health Belief Model (HBM) as an effective means of analyzing health behavior adherence. The HBM focuses on understanding what motivates an individual to participate or not participate in health related behaviors. Components of the model include perceived benefits, barriers, seriousness, susceptibility, and health motivation (Rosenstock, 1974). A more recent addition to the model is the concept of self-efficacy.

Various studies have used the HBM to examine patient adherence, post cardiac event, to the prescribed exercise regimen in a CR program. Foster (1995) found that subjects who adhered to prescribed treatment plans perceived more benefits, fewer barriers, and had higher self-efficacy than subjects who were non-adherent. The aim of this study was to expand upon Foster's work. The information gained can assist health professionals to promote adherence to treatment plans and motivate patients to become vested in preventative behaviors.

Purpose

The purpose of this study was to determine if the strengths of selected constructs of the Health Belief Model in individuals with CAD who are adherent to an exercise program differ from those of individuals with CAD who are non-adherent to an exercise program. Specifically the study examined perceptions of benefits, barriers and self-efficacy among subjects who had angina, myocardial infarction, or atherosclerotic lesions in the coronary arteries.

CHAPTER II

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Conceptual Framework

The conceptual framework used in this study is the Health Belief Model (HBM). Developed in the early 1950's by social psychologists, Rosenstock, Hochbaum, Kegeles, and Leventhal (Rosenstock, 1974), the HBM provided a framework to investigate why some individuals would participate in preventative health actions or health screening while others would not. As investigators in the Public Health Service, they were concerned with widespread reluctance of individuals to participate in screening for tuberculosis, cervical cancer, dental disease, and immunizations even when the tests were free or of nominal charge (Rosenstock, 1974). The HBM provided a framework to explain the various components involved in an individual's decision whether to accept or reject a preventative health measure.

Rosenstock (1974) indicates that the development of the HBM was heavily influenced by the earlier theories of Kurt Lewin in the 1940's. Lewinian theory contends that how an individual perceives the surrounding world determines what he will or will not do. The probability of a behavior being exhibited is influenced by the individual's perception of the positive or negative value of that behavior. Becker (1974) went on to

modify the HBM to explain and predict patient compliance to prescribed regimens. The HBM assumes that (a) health is valued, (b) an individual's beliefs significantly influence health behaviors, and (c) cues to action are widely available. The original components of the model theorized that for an individual to engage in a preventative health action he/she must believe that (a) he/she is susceptible or vulnerable to the disease (susceptibility), (b) the disease would have at least moderately severe consequences (severity), (c) the action would be beneficial and efficacious (benefits), and (d) the barriers to such action would be minimal.

In 1988 Rosenstock, Strecher and Becker incorporated Bandura's (1977) concept of self-efficacy (SE) into the HBM to strengthen the model's ability to offer understanding of the influences of health related behaviors. Self-efficacy contends that health behaviors are influenced by an individual's belief that one is or is not capable of the necessary behavior to produce the desired outcome.

Later, a cue to action component was added to the HBM to describe a trigger for an individual to take the appropriate health related action. Modifying factors include demographic, sociopsychological, and structural variables that predispose or influence an individual's perception of the health related action.

The HBM concepts as they relate to adherence to prescribed care post cardiac event are as follows:

1. Perceived susceptibility to disease is the individual's perception of the likelihood or vulnerability to developing further progression of CAD.

2. Perceived seriousness of disease is the individual's perception of the impact of developing further progression of CAD. This is influenced by the degree of emotional arousal created by the thought of further disease, and by the perceived difficulties the disease would create.

3. Perceived threat is the perceived susceptibility combined with perceived seriousness that determines the total perceived threat of CAD progression and consequence.

4. Perceived benefit is the individual's belief regarding the effectiveness of the prescribed action in restoring a healthy state and reducing the risk of CAD progression following a cardiac event.

5. Perceived barrier is the negative aspect, perceived or real, that prohibit adopting the prescribed action following a cardiac event: cost, inconvenience, time, fear of pain, change.

6. A cue to action is an event or stimuli that would prompt the individual to take appropriate action. It may be an internal cue such as memory of the condition, or symptoms, or external such as advice from others, media, or reminder post cards.

7. General health motivation is an individual's overall intent or concern for health that results in behaviors to maintain or improve health.

8. Modifying factors are factors that influence an individual's perceptions and health related behavior including demographic, sociopsychological, and structural (knowledge or prior contact).

9. Self-efficacy (SE) is the individual's belief of how capable he/she is of carrying out the prescribed behavior to produce the desired outcome.

In summary, the HBM provides a useful framework for explaining and predicting health behaviors including behaviors related to CAD and adherence to CR exercise programs. The model contends that an individual who perceives positive benefits of exercise, with few perceived barriers and has the confidence or SE to engage in exercise, will be more likely to adhere to a CR exercise program. The variables in the model lend themselves to nursing interventions. By evaluating an individual's attitudes and beliefs, and specific health related behaviors, or lack of behaviors, health professionals can develop effective, individualized mechanisms to predict and enhance adherence to recommendations. This study replicated, as closely as possible, the work done by Foster (1995) which examined the concepts of perceived benefits, perceived barriers, and SE in relation to adherence to the CR exercise program.

Literature Review

The Health Belief Model (HBM) as a theoretical framework with and without the constructs of SE is widely used by researchers in many health arenas. Research has shown the model's usefulness for examining the relationship of health beliefs and adherence to cardiac exercise programs by individuals with CAD. The following review of the literature will first examine the constructs of the HBM as they relate to cardiac rehabilitation followed by non-cardiac studies using the HBM. Finally, studies supporting the relationship between cardiac exercise and regression of CAD will be examined.

Cardiac Rehabilitation

Tirrell and Hart (1980) studied 30 subjects, ages 46 to 75 years, from the midwest who had undergone coronary artery bypass grafting (CABG) in the prior 10 to 12 months. Data were collected through interviews done in the subject's home by the researcher. Perception of susceptibility, seriousness, barriers, and benefits, as well as level of understanding and knowledge about the exercise regimen was evaluated in relationship to adherence. The perception of barriers had the strongest correlation with non-adherence to a prescribed exercise program. Higher levels of perceived barriers were associated with lower levels of adherence. The researchers noted that while 60% of the group self-reported adherence with the exercise regimen, they were not properly following the prescribed method of walking, nor the pulse monitoring function, thereby categorizing them as non-adherent. Only one subject was determined to be adherent as defined by the study. The investigators concluded that the strict program guidelines contributed to their exceptionally low adherence finding.

Perceived benefits of recommended behaviors have been positively associated with adherence. Muench (1987) evaluated the health beliefs of 72 subjects with a history of MI and/or CABG enrolled in a cardiac exercise program from one to 24 months. A descriptive correlational design was used to explore the relationships of susceptibility, seriousness, benefits, barriers, SE, and motivation to adherence in a cardiac rehabilitation exercise program through the use of questionnaires. Subjects with higher levels of perceived benefits to exercise programs had significantly higher levels of general health

motivation, $p < .001$, SE, $p < .001$, and reported fewer barriers to attendance $p = .008$. Increased stamina, medical supervision, and expected regular participation were noted benefits from participation, while transportation, early morning schedules and interference with other scheduled activities were important barriers to participation.

In a descriptive study done by Hiatt, Hoenshell-Nelson, and Zimmerman (1990), 39 hospitalized subjects with CAD were asked to identify factors that influenced participation in a cardiac rehabilitation program including perceived susceptibility, severity, benefits, and barriers to participation. Subjects who participated in cardiac rehabilitation programs perceived greater benefits and fewer barriers than those who did not, $t = 4.19$, $p < .001$. No significant difference for perceived susceptibility or perceived severity was found between groups. Interestingly, when demographic variables were examined, there were significant differences between the groups. Subjects with incomes greater than 20 thousand dollars per year perceived more benefits and fewer barriers than those whose incomes were less than 20 thousand dollars per year, $t = -3.02$, $p < 0.01$. Additionally, subjects who were married perceived more benefits and fewer barriers than non-married subjects, $t = 2.01$, $p = 0.05$. The investigators note that the small sample size limits generalizability of the findings. Other limitations include the use of a volunteer sample and use of a single study site.

Oldridge and Streiner (1990) used the HBM in conjunction with the Health Locus of Control model to predict adherence to a cardiac rehabilitation program. Questionnaires were completed by 120 subjects at the beginning of the study. The HBM variables

examined included motivation, severity, susceptibility, benefits, barriers and cues to action. Prediction of group membership (compliers or dropouts) at the end of six months was carried out by discriminate function analyses at the end of six months. The researchers found that by using the HBM they were able to accurately predict subject adherence 64% of the time.

Kison (1992) used a descriptive correlational design to investigate 31 subjects with CAD two months post hospitalization. Perceived benefits and barriers were examined in relationship to adherence to various recommended health behaviors. Degree of adherence was positively correlated with health beliefs regarding checkups. The results indicated the highest level of adherence was to medications, and the second highest level of adherence was to activity. Collectively, subjects perceived more benefits than barriers to checkups. College educated subjects reported more benefits to checkups and greater adherence to activity regimens as compared with non-college educated subjects.

Self-efficacy was incorporated into the HBM to strengthen the model's ability to predict and understand behaviors. Studies have indicated strong support for this concept. Strecher, DeVellis, Becker, and Rosenstock (1986) reviewed 21 studies examining SE in relation to health practices including adherence to exercise programs. They concluded that increased levels of SE were associated with adherence and maintenance of exercise both short and long term.

Perkins and Jenkins (1998) support the concept that SE expectations are predictive of subject's participation in risk factor modifying behaviors. Ninety subjects, mean age 61,

who had undergone percutaneous transluminal coronary angioplasty (PTCA) reported higher levels of SE expectations for engaging in the recommended behaviors of walking, low-fat diet, health maintenance, resumption of role, and return to work. Measurement of subjects' self-efficacy expectations positively correlated with the subjects own rating of how they expected to perform and actually did perform immediately post PTCA and at two weeks post PTCA in all categories except return to work $p < 0.01$.

Conn (1998) used interviews and questionnaires to examine the relationship between SE and exercise behavior among 147 adults age 65 and older. Subjects were recruited from various non-medical sites in two states. Perceived barriers were also measured in this study. Consistent with other studies, SE had a positive effect on exercise behavior, while perceived barriers had a negative influence $p = .0001$.

Robertson and Keller (1992) examined the relationship between the constructs of the HBM including SE and exercise adherence among patients with CAD. A convenience sample of 51 men and women who had undergone PTCA or CABG in the past four to eight months were studied in terms of benefits, barriers, susceptibility, seriousness, SE and adherence. Perceived barriers had a significant, inverse correlation with adherence to exercise, $r = -0.390$, $p = 0.005$. SE correlated positively with exercise, $r = 0.352$, $p = 0.005$, as did benefits, $r = 0.229$, $p = 0.016$. However, the investigators point out that both SE and benefits were not significant explanatory variables in the multiple regression analyses and results must be used with caution.

The HBM has been criticized for producing conflicting results requiring further

work with the model. In a retrospective study of 57 subjects who had completed a comprehensive program for coronary heart disease, Mirotznik, Feldman, and Stein (1995) examined susceptibility, seriousness, benefits, barriers, and general health motivation as each related to exercise adherence. General health motivation and perceived severity of coronary heart disease had the strongest positive correlation with adherence, $p < .05$. The authors indicated that the results must be used with caution due to study design, flaws in tool development, and sample size.

Janz (1988) and Janz and Becker (1984) reviewed multiple studies based on the HBM. They determined that perceived barriers were the most significant dimension associated with cardiac risk factor modification behaviors in all study designs. They concluded that perceived barriers are the dimension most frequently left unmeasured in empirical research.

Radtke (1989) examined the relationship between self-motivation and adherence to CR exercise programs among individuals who had sustained a MI. A convenience sample of 28 subjects instructed in a home CR exercise program were mailed questionnaires between six and 12 weeks post-hospitalization. The author reported an initial adherence rate of 89%. Six months later, the adherence rate remained moderate at 82% as measured by Radtke. Adherence and self-motivation showed a significant relationship at six weeks, $r = .41$, $p = <.05$, and only a moderate relationship at 6 months, $r = .338$. The small sample size limits generalizability of results.

This present study replicates the research conducted by Foster (1995). Her study

examined 90 subjects post hospitalization with the diagnosis of MI, angina, CABG or angioplasty. Data were collected from two hospitals in the midwest. She looked at the relationship of health beliefs toward exercise and the adherence to an exercise program post cardiac event. The hypothesis tested was that perceived benefits, barriers, and SE of individuals who are adherent to an exercise program would differ from those who were non-adherent. The sample of 69 males and 21 females responded to mailed questionnaires. Sixty-seven percent of the subjects reported they were adherent to a program and 33% reported non-adherence at six to eight weeks post hospitalization.

Foster (1995) found that perceived benefits, barriers, and SE had a significant relationship to exercise post cardiac event. Subjects who had higher levels of SE, or believed they could initiate and maintain the prescribed exercise program were more adherent. Subjects who perceived more benefits and fewer barriers to exercise were more adherent. In addition to the stated hypothesis, the relationship between adherence and selected demographic variables was examined. Results showed that subjects who were married were more likely to be adherent. Males were more likely than females to be adherent, and those reporting professional or semi-professional occupations were more adherent than unskilled laborers.

Several limitations were noted in Foster's study. The effects of history or prior exposure to an exercise program were not measured. Non-adherent subjects were not given the opportunity to explain their reason for non-adherence. The small sample size limited its generalizability.

In summary, the previous studies demonstrate that adherence to a cardiac exercise program is strongly linked to perceived benefits, perceived barriers and SE. Those individuals who have higher levels of SE and perceive more benefits are more adherent, while individuals with lower SE and perceive more barriers are less adherence.

Non-Cardiac Studies

The HBM has been used to explore adherence to behaviors other than those associated with cardiac exercise. Kim, Horan, Gendler, and Patel (1991) developed the Osteoporosis Health Belief Scale to measure health beliefs related to osteoporosis. Benefits, barriers, seriousness, susceptibility, and motivation were used to examine 150 elderly individuals' health beliefs related to exercise behaviors and calcium intake. Results demonstrated that barriers and health motivation were important in explaining health behaviors.

Likewise, perceived barriers was a significant predictor of breast self-exam (BSE) in a study conducted by Champion (1987). The HBM variables of susceptibility, seriousness, benefits, and barriers along with motivation and knowledge of breast cancer were examined in relationship to frequency of BSE. A convenience sample of 585 women from a large outpatient clinic was evaluated. Champion found that perceived barriers and knowledge significantly predicted frequency of BSE at the level of $p < .001$. Women who perceived fewer barriers practiced a higher frequency of BSE. Likewise, women taught BSE by a health professional had a higher frequency of BSE. The results support the

findings of earlier works by Champion (1984).

Desharnais, Bouillon, and Godin (1986) evaluated the predictive ability of self-efficacy and outcome expectations to determine exercise adherence in a general fitness program conducted in a university setting with 98 subjects. Attendance records at the completion of the program measured adherence. Results indicated that SE is a reliable predictor of an individual's adherence to the program as well as a significant cognitive mediator of adherence ($p < .002$). Problems with adherence are predictable when SE is low. Potential dropouts showed uncertainty at the outset about the ability to complete the program.

A study by Dai and Catanzaro (1987) used the HBM variables of susceptibility, seriousness, benefits and barriers to examine adherence to skin care recommendations in twenty paraplegic men. Results indicated that perceived benefits of skin care, $r = .62$, had the highest level of correlation to adherence, and the second highest level of correlation to adherence was with perceived seriousness, $r = .56$, $p < .01$. Perceived susceptibility and barriers were not significantly related to adherence. However, the strongest correlation to adherence was found when the scores of all four variables were combined, indicating a synergistic effect of HBM constructs toward adherence $r = .70$, $p < .001$. The authors pointed out the limits of the small sample size and the lack of generalizability to other subject populations.

The HBM was used by Yeomans-Kinney, Vernon, Frankowski, Weber, Bitsura, and Vogel (1995) to examine factors that predicted women's enrollment in a Breast

Cancer Prevention Trial. Questionnaires were analyzed from 232 Caucasian women referred to a southern cancer center. No significant differences were found between participants and nonparticipants in the areas of susceptibility, seriousness, cues to action, or health motivation. A significant difference was recognized in the area of perceived barriers, $p < .001$, lending support to the strength of this construct in predicting health related behaviors.

Nelson (1991) examined differences in perceived health, self-esteem, health habits, and perceived benefits and barriers to exercise between two groups. The purpose of the study was to determine what impact a life-threatening disease such as breast cancer has on a woman's life. A random sample of 55 women with Stage I breast cancer was matched to a cohort of women without cancer. Responses measured perceptions of benefits and barriers to participation in an exercise program. The author indicates that the state of readiness to change health behaviors is dependent upon how health habits and exercise patterns are incorporated into daily living. Women in the non-cancer group had significantly higher mean scores for perceived benefits and barriers to exercise $t = 2.4$, $p = .18$. No differences were noted between the groups in perceived health, self-esteem or health habits.

In summary, there is much support for the strength of the HBM in predicting behaviors in many settings. Increased perceived benefits, and SE and decreased barriers are the strongest indicators across the studies, predictive of adherence to health behavior.

Regression of CAD

Risk factor modification and structured physical activity have been demonstrated to reduce the progression of CAD, and thereby decrease the mortality from CAD (Sytkowski, Kannel, D'Agostino, 1990; Malloy, 1993).

Schuler et al. (July, 1992) specifically examined regular physical exercise and diet in relation to progression of CAD as measured by the increase or decrease in luminal diameter of known arteriosclerotic lesions in the coronary arteries. Patients were randomized to control ($n = 50$) or interventional ($n = 40$) groups after routine coronary angiography. Intervention consisted of dietary guidelines as well as daily exercise on a cycle ergometer for a minimum of 30 minutes. The control group was assigned to routine care. After 12 months, a second angiogram was performed. The interventional group demonstrated positive results. No change in luminal diameter was noted in 45% of cases and 32% noted regression of the lesion. Only 23% of the interventional group had further narrowing of the lumen. In the control group, significant progression of the disease was noted in 48% of patients, no change in 35%, and regression of disease in 17%, $p < 0.05$. The study reported a 68% compliance rate with recommended exercise for the experimental group, however the compliance rate for the control group was intentionally not measured as their care was rendered by private physician. This study could have been strengthened by applying the same measurement to the control group so as to have a more meaningful comparison.

A similar study measuring the change in arteriosclerotic lesions was conducted by

Ornish et al. (1990). In a randomized study called The Lifestyle Heart Trial, patients with documented CAD were assigned to control (n = 19) or interventional (n = 22) groups. Control group patients were not asked to make life style changes. Experimental group patients were asked to make changes in the areas of diet, stress management, smoking, group support, and moderate aerobic exercise for a period of one year. Coronary arteriography was performed at baseline and again at one year.

Ornish et al. found that 82% of subjects in the experimental group had a significant regression of their CAD disease as measured by an increase of the luminal diameter. Slight progression of CAD was noted in three patients and substantial progression in one patient in the experimental group. Fifty three percent of subjects in the control group had a progression of CAD as measured by a narrowing of the luminal diameter. Regression of CAD was noted in eight patients and one patient showed no change. The overall adherence to the lifestyle changes was reported as excellent. The authors found a positive correlation with changes in percentage of luminal diameter stenosis, p = .001. Those who made the most changes to improve health behaviors demonstrated the greatest reduction in CAD.

LaFontaine (1995) reviewed nine studies conducted since 1990 that examined the influences of changes in risk factors on the progression of CAD, including diet, exercise, and stress management. All but two studies included the positive effects of exercise on CAD. All studies demonstrated a significantly higher rate of stabilization or regression of atherosclerotic lesions in the interventional groups as compared to control groups. Results

of these studies and others support the fact that exercise, such as that recommended by cardiac rehabilitation programs is beneficial in the stabilization and regression of CAD.

Summary and Implications for Study

In summary, the HBM variables of benefits, barriers, and SE were found to be useful in predicting health behaviors. Individuals who perceived increased benefits to participating in a CR exercise program while perceiving few barriers were more likely to have higher levels of adherence. It is also important for the individual to believe they have the ability to perform and complete the recommended behaviors. Increased SE promotes increased adherence. The results of the previous studies support this relationship.

The studies on regression of CAD clearly support the relationship between exercise, diet and regression of the atherosclerotic lesion which is the focal point of CAD. Sufficient exercise combined with a diet low in fat will slow the development of CAD. With the devastating impact of CAD, it is important to gain further understanding of factors that influence health behavior change. This information will guide the development of more individualized and appropriate interventions to assist cardiac patients to achieve and sustain risk factor modification behaviors.

Research Hypothesis

The hypothesis tested in this study was: Perceived benefits, barriers, and SE of individuals who are adherent to a cardiac exercise program will differ from individuals who are non-adherent as measured by the HBM.

Definition of Terms

Perceived benefits are beliefs regarding the effectiveness of the cardiac rehabilitation exercise program in restoring a healthy state and reducing the risk of recurrent episodes following a cardiac event.

Perceived barriers are negative aspects, perceived or real that prohibit participation in a cardiac rehabilitation exercise program following a cardiac event.

Self-efficacy is belief regarding one's ability to perform and maintain the recommended actions of the cardiac rehabilitation exercise program.

Adherence is the degree to which an individual's behavior coincides with the prescribed cardiac rehabilitation exercise program.

Cardiac rehabilitation exercise program is a prescribed aerobic exercise program for cardiovascular training and muscular conditioning post cardiac event.

CHAPTER III

METHODOLOGY

Study Design

This study replicated earlier research by Foster (1995). A descriptive, correlational design was used to determine the differences in health beliefs between individuals who were adherent to a cardiac rehabilitation exercise program and those who were non-adherent. Data from subjects who participated in a CR program were collected 6 to 12 weeks post hospitalization for a coronary event. Qualifying events included angina pectoris, myocardial infarction, coronary angioplasty or stenting, or coronary artery bypass grafting. Constructs measured included perceived benefits, perceived barriers, SE, and exercise adherence.

Efforts were made to control for internal and external threats to validity. Data were collected to determine whether history could be a significant factor, as some subjects may have had previous experience in a CR exercise program. To control for this, data were collected on prior exercise exposure. There were no institutional or media campaigns noted during the course of the study. Post cards were sent to all subjects two weeks after they received the questionnaires reminding them to complete their questionnaires and return them, thereby reducing the threat of mortality and attrition. To reduce experimenter bias, a typed explanation was used to solicit patient's participation in the

study. As stated earlier, the purpose of replicating the Foster study was to see if the findings could be duplicated. If results are similar, it is less likely that the results were due to external threats.

This study was part one of a two-part study measuring subjects adherence at 3 months and again at 6 months. Part two of the study, measuring changes in adherence over a longer period of time, will be conducted by another investigator.

Sample and Setting

Subjects were recruited from a large private cardiology practice in west Michigan. Providers in the practice managed patients' comprehensive cardiology services, including diagnosis, treatment, education and prescription for rehabilitation of cardiac patients. Providers refer approximately 30 patients per month into a cardiac rehabilitation program. Permission to contact patients was obtained from the research committee of the cardiology practice. Data were collected from a convenience sample of patients who met the eligibility criteria and consented to participate in the study.

Eligibility criteria included:

1. Age 21 or older.
2. Documented CAD with a diagnosis of myocardial infarction, or angina pectoris, or having undergone angioplasty, stenting, or coronary artery bypass grafting.
3. Lack of significant cerebral, renal, pulmonary or cardiac complications that would prohibit participation in an exercise program.
4. Able to read English.

5. Had been prescribed and received formal instruction for a home exercise schedule through the cardiac rehabilitation program.
6. First or second time through a Cardiac Rehabilitation program.
7. Given consent to participate in the study.

Instruments

Measurement of subject's responses to perceived benefits, perceived barriers, and SE were collected using the Cardiac Exercise Health Belief Scale, the Exercise Compliance Questionnaire, and the Cardiac Exercise Self-Efficacy Scale. A demographic questionnaire was also included. Reliability of all instruments except the demographic questionnaire was examined using data from this study.

Cardiac Exercise Health Belief Scale

The Cardiac Exercise Health Belief Scale (CEHBS) was developed by McGinn (1995) to measure subjects' health beliefs in relation to adherence to a regular cardiac exercise program (See Appendix A). The instrument was adapted from the Breast Self-Examination (BSE) instrument (Champion, 1984) and the Osteoporosis Health Belief Scale (Kim et al. 1991). Whereas the BSE and the Osteoporosis Health Belief Scale (OHBS) measures all of the major constructs of the HBM, the CEHBS measures only perceived benefits and perceived barriers. The instrument consists of 10 benefit plus 11 barrier items with scores ranging from a minimum of 10 to a maximum of 50 for the benefit scale and 11 to 55 for the barrier scale. A five point Likert scale is used to rate the items from strongly agree (5) to strongly disagree (1).

Cardiac rehabilitation nurses as well as nursing educators and experts in HBM theory established content validity of the CEHBS through review. During development of the CEHBS instrument, readability and language level was ensured by conducting a pretest with fifteen cardiac rehabilitation patients. The benefits and barriers subscales were evaluated for internal consistency. Cronbach's coefficient alpha was .90 for the benefit subscale and .84 for the barrier subscale. The construct validity of the CEHBS was evaluated by factor analysis and resulted in a two-factor solution, benefits and barriers. All items relating to a specific concept loaded under the respective subscale (McGinn, 1995).

Cardiac Exercise Self-Efficacy Scale

The Cardiac Exercise Self-Efficacy Scale (CESES) was developed by McGinn (1995) and Foster (1995) through adaptation of the Osteoporosis Self-Efficacy Scale (OSES) by Horan, Kim and Gendler (1998) (See Appendix B). The instrument consists of six items arranged as a visual analog with total score ranges of zero to six hundred. The lower anchor of each item is "not confident at all" (0) and the upper anchor "very confident" (100). Cronbach's coefficient alpha was reported as .90. Content validity was evaluated by nursing experts, while construct validity was determined by factor analysis. Criterion related validity of the instrument was evaluated by discriminate function analysis (Horan, Kim, & Gendler, 1998). Foster reported cronbach's coefficient alpha of .94 with her study. The current study calculated an alpha of .74.

The CESES was constructed like the OSES using the same anchors and scoring,

however, the mean score for the six items was used. Therefore, the total possible score of the CESES ranged from 0 to 100.

Exercise Compliance Questionnaire

To determine the level of patients' compliance with their home exercise program the Exercise Compliance Questionnaire (ECQ) was used (See Appendix C). This data divided the sample into two groups: adherent and non-adherent to exercise. Developed by Radtke in 1989, the eight multiple-choice questions on the tool evaluate frequency, method, intensity, and duration of exercise. Questions one through four evaluate compliance. Questions five through nine were designed to collect information and do not determine adherence to the exercise program. The answers are listed in numerical order with a score accumulated according to the numbers selected. Physical therapists who prescribed home exercise reviewed the content of the ECQ for face validity. Reliability of the instrument was not reported.

According to Radke's instrument, individuals were considered adherent if they had a score of two or higher on questions one and two, and a total score of five or more on questions one through four. Scores less than five on questions one through four were considered non-adherent to the exercise program.

Demographic Data Questionnaire

A separate questionnaire was used to obtain demographic data. Items included information about age, gender, race, marital status, education, employment, income level, risk factor identification, medical insurance coverage, date of discharge, and physical

limitations. (See Appendix D)

Procedure for Data Collection

Names of potential subjects were obtained from a private cardiology practice in the mid-west. All subjects who met the eligibility criteria were recruited by mail once they had been discharged home from the hospital. Subjects were sent a packet of materials between 6 and 12 weeks post cardiac event. This time period was chosen to allow appropriate healing and significant time to begin the exercise program recommended by the CR program. The packet contained the consent form (Appendix E), patient instructions, the instruments, a demographic data collection sheet, a post card for subsequent withdrawal and a stamped return envelope. Approximately 20 minutes were required to complete the packet of questionnaires. The consent form provided information about methodology, risks, potential benefits, voluntary participation and the right to withdraw at anytime. A postcard was mailed to all subjects two weeks after they received the questionnaires reminding them to complete their questionnaires and return them. Results of the study were made available to subjects upon written request to the researcher.

Human Subjects Consideration

Approval to conduct the study was obtained from the Grand Valley State University Human Research Review Committee. There were no expected physical or emotional risks to participants of this study. Participation in the study was voluntary, and subjects could withdraw at any time. Information was confidential and only the

investigators of both parts of the study had access to the data. Approval to contact subjects was obtained from the research committee of the cardiology practice.

CHAPTER IV

RESULTS

The results of this descriptive correlational study are presented with the data analysis first, followed by a description of the subjects, and finally the hypothesis testing.

Data Analysis

Data were collected from volunteer cardiac rehabilitation participants over a 3-month period from July 23, 1998 to October 23, 1998. Each subject completed the four questionnaires that were scored separately, the Cardiac Exercise Health Belief Scale, Cardiac Exercise Self-Efficacy Scale, Exercise Compliance Questionnaire and a Demographic Questionnaire. The Cardiac Exercise Health Belief Scale consists of separate benefit and barrier questions that yield separate scores for each of the two constructs. Higher scores on the benefit or barrier scales mean the subject perceives more benefits or barriers. Conversely, lower scores indicate the subject perceives less benefit or barriers.

The Cardiac Exercise Self-Efficacy Scale consists of six items that ask subjects how confident they are about performing various aspects of exercise. The higher the score on each item, the more confident they are in their ability to perform that behavior.

Scores from the Exercise Compliance Questionnaire were used to divide the subjects into two groups, adherent and non-adherent. Individuals were considered

adherent if they had a score of two or higher on questions one and two, and a total score of five or more on questions one through four. Adherent subjects exercised at least three times per week for 20 or more minutes by either walking or bicycling at specific rates of speed. A detailed description of the scoring methodology for each questionnaire was presented in chapter three.

The independent variables of the study were perceived benefits, perceived barriers and SE. All three variables were measured using a Likert or visual analog type scale permitting total scores to be treated as interval level measurement. The dependent variable was exercise adherence to a specifically prescribed home exercise program through a cardiac rehabilitation program. Measurements of this variable were used to dichotomize the subjects into two categories, adherent or non-adherent to the prescribed program. Demographic data was collected at the nominal level. A non-paired t-test was used to determine statistical differences between adherent and non-adherent groups. The Statistical Package for the Social Sciences was used to perform statistical analysis and reliability measurements of the instruments. The level of significance was set at $p < .05$. Reliability of the benefit portion of the CEHBS was established at .839, while the barrier portion was established at .799. The reliability of the CESES was .737.

Characteristics of the Subjects

During the 3 month period, 70 subjects from a private cardiology practice were sent packets of material requesting their participation. Each of these subjects had received a formal cardiac rehabilitation prescription for a home exercise program, and met the

eligibility criteria. Twenty-five subjects ranging in age from 36-78 years (M 58; SD 11.83) signed consents and responded for a return rate of 35.7%. Nine subjects returned response cards declining participation. A description of the subjects is presented in Table 1. The subjects consisted of 20 male participants and 5 females. Ninety two percent (n = 23) were Caucasians and two were Afro-American. Twenty-three of the participants were married, two were non-married. The educational grade for the sample ranged from 12 to 18 years (M 15.5; SD 2.30). Incomes for the participants ranged from the defined $10-20,000 range to greater than $60,000 per year. Frequencies of these and other characteristics that were extracted from the demographic questionnaire are presented in Table 2.

Table 1

Characteristics of Subjects (N = 25)

Characteristic	n	%
Gender		
Male	20	80%
Female	5	20%
Ethnicity		
Caucasian	23	92%
Afro-American	2	8%
Marital Status		
Married	23	92%
Non-married	2	8%
Work Status		
Employed	16	64%
Unemployed	9	36%
CR Insurance Coverage	25	100%
First time in CR	23	92%

Table 2

Frequencies of Selected Demographic Characteristics

Characteristic	Frequency	Percent
Occupation		
Maintenance Superintendent	2	8%
University Professor	1	4%
Executive	1	4%
Receptionist	1	4%
Police Officer	1	4%
Supervisor	1	4%
School Psychologist	1	4%
Realtor	2	8%
Pharmacist	1	4%
Attorney	3	12%
Retail Representative	1	4%
Meat Cutter	1	4%
Truck Driver	1	4%
Dispatcher	1	4%
Manager	1	4%
Professional Engineer	1	4%
Paint Blender	1	4%
Sheet Metal Worker	1	4%
Teacher	1	4%
Plumber	1	4%
County Drain Commissioner	1	4%
Income		
$10-$20,000	1	4%
$20,001-$30,000	2	8%
$30,001-$40,000	3	12%
$40,001 -$50,000	4	16%
$50,001-$60,000	4	16%
> $60,000	9	36%
No answer	2	8%

(table continues)

Characteristic	Frequency	Percent
Education in years		
12	4	16%
13	2	8%
14	3	12%
15	1	4%
16	5	20%
17	1	4%
18	8	32%
no answer	1	4%
First time in CR		
Yes	23	92%
No	2	8%
Other exercise exposure		
Yes	6	24%
No	19	76%
CR Insurance Coverage		
70%	1	4%
80%	3	12%
90%	1	4%
100%	15	60%
Unsure	5	20%
Physically Unable to Exercise		
Yes	2	8%
No	22	88%
No answer	1	4%

Comparison of Adherent and Non-adherent Groups

As previously mentioned, scores from the Exercise Compliance Questionnaire were used to determine which group subjects were placed in. Seventy six percent (n = 19) of the subjects were in the adherent group, while 24% (n = 6) were in the non-adherent group. The comparison of perceived benefit, barrier and SE scores for adherent and non-adherent groups is presented in Table 3. There were no significant differences between the two groups in any of the categories. The non-adherent group tended to score higher in all three areas, benefits, barriers and SE than did the adherent group, which is in the reverse direction of the research hypothesis, but not significant.

Table 3

Benefit, Barrier and SE Comparison of Two Groups

	Group						
	Adherent (n=19)		Non-adherent (n=6)				
HBM variable	M	SD	M	SD	t	df	p
Benefit	45.74	3.74	45.83	4.07	.05	23	.96
Barrier	23.58	6.15	24.33	6.28	.26	23	.80
SE	79.49	13.26	84.25	15.91	.73	23	.47

The adherent and non-adherent groups were compared on the basis of age and education. The mean age of the adherent and non-adherent groups was 58.21 and 55.83 years and the mean years of education were 15 and 17 respectively. No statistical differences were found between the groups for age and education.

Benefit, barrier and SE scores were compared to gender, and also prior exercise exposure. No significant differences were found. Prior exercise exposure was reported by 24% ($\underline{n} = 6$).

In summary, there were no statistical differences found between adherent and non-adherent groups when comparing perceived benefits, barriers and SE. In addition, no significant differences were found when comparing the two groups by age, gender, or prior exercise exposure. Analysis of demographic data likewise did not yield a statistical difference.

Hypothesis Testing

In this study, the hypothesis was that perceived benefits, barriers and SE of individuals who were adherent to a CR exercise program would differ from individuals who were non-adherent. Analysis of data did not reveal a statistical difference between the groups for the three HBM constructs measured.

CHAPTER V

DISCUSSION AND IMPLICATIONS

Discussion

In many disciplines of health care, lack of patient adherence to prescribed therapeutic recommendations is a noted concern (Phan, Fortin & Thibaudeau, 1996; Canupp, Waites, DeVivo & Richards, 1997; Taggart & Connor, 1995; and Sass, Bertolone, Denton & Logsdon, 1995). Dropout rates for CR exercise programs are reported at 40-60% (Comoss, 1988; Oldridge, 1991 and Hellman, 1997). Ades, Waldmann, McCann and Weaver (1992) reported an initial participation rate of only 21%. As one looks for more creative and sensitive ways to educate patients, one of the most important issues to deal with is how to get patients to initiate and maintain behaviors that health care research has shown to be efficacious. How do health care professionals educate patients so they develop a vested interest in their health and the behaviors that promote health? Without patient adherence, therapeutic goals cannot be reached, resulting in less than optimal patient outcomes.

As outlined by Oldridge (1991), LaFontaine (1995), Schuler et al. (July, 1992) and Ornish et al. (1990) the benefits to be gained by adherence to a CR program are significant and include a 25% reduction in fatal events post MI and slowing the advancement of lesion development in the coronary arteries. In some cases a reduction in the size of the

lesion was documented. Evidence such as this implies that adherence to behaviors learned through a CR program can have a beneficial and lasting impact on the lives of individuals with CAD. This lends even further support for the need to determine what causes some individuals to be adherent and others non-adherent. Reducing the prevalence of CAD or the number of reoccurrences in individuals would have far reaching effects including easing the burden on the health care system, keeping people gainfully employed, and reducing the economic burden both individually and nation wide. Nurses have an opportunity to play a key role in reaching this goal.

The purpose of this study was to determine if the perceived benefits, barriers and SE of individuals who are adherent to an exercise program differs from individuals who are non-adherent to an exercise program. While the findings of this study did not produce significant findings, there is still much to be explored regarding the intended purpose.

Limitations

The obvious limitation of this study was the small sample size. With 25 subjects, the majority of which were in the adherent group, statistical differences could not be discerned with any of the comparisons. The convenience sample was recruited from a local cardiology practice, a study design chosen for convenience and efficiency. The resulting sample represents a skewed population in that the majority of subjects were white, middle aged, professional men with incomes greater than $50,000 per year. This limits the generalizability of any potential findings due to the fact that the characteristics of the sample are not representative of the larger population.

To limit the effect of history of this study, subjects were questioned as to prior exercise exposure. There were two subjects who indicated that they had completed a CR program previously. Six out of the 25 subjects indicated they had previous exposure to a formal exercise program. The small sample size limited the comparison of the effect this previous exposure might have had upon subject's responses to the current study.

Foster (1995) recommended that reminder post cards be sent to non-respondents two weeks after the packet was mailed, encouraging their participation. Of 34 subjects in the current study who received reminder cards, 10 responded. Investigators need to continue to explore ways to enhance participation.

Recommendations

Sample size in the current study was small, limiting meaningful calculations and generalizability. The recruitment of a larger number and broader diversity of subjects from multiple sites would be recommended for future study. Any appropriate methodology to improve recruitment should be considered. Meeting individual subjects initially face to face to review the study and instructions might prove more beneficial than communicating solely via mail. Face to face meetings could then be followed up with reminder post cards, or a telephone call.

Foster (1995) purposed that even though it is important to assess the health beliefs of subjects early on, it is important to recognize that the effect of patient education might not be realized immediately. She suggested that subjects be re-evaluated eight months to one year later to explore that relationship. Even though the current study did not yield

significant differences between the two groups, the element of time may allow differences to develop. The current study is part of a two-part study. The same individual subjects from this study will be evaluated again in three to six months. Results from the two studies will be compared looking for differences over time. While several months may result in differences, it is recommended that a longitudinal study be undertaken, to determine if greater differences occur over time. There are numerous reports in the literature that over time, individuals continue to change their pattern of exercise and health behaviors, with the rate of drop out increasing as time passes.

It is also recommended that information be solicited as to the specific barriers the non-adherent subjects perceive toward the CR program that prevent them from participating. Information gained would allow experts to consider how to make adjustments in, re-engineer, or create new or different programs that offer more benefits and minimize the barriers to CR programs. It is quite conceivable that there may be better ways to educate and encourage patients toward healthier behaviors than our current methodology.

Future studies might also explore the difference in adherence rates to CR programs based on subjects' specific cardiac diagnoses, e.g. the difference between subjects with a MI versus CABG versus angioplasty. The current study could be replicated to achieve this using diagnoses as an additional variable for comparison.

For the current study, adherence was defined by the subject's score on the Exercise Compliance Questionnaire. It inquired as to what type of exercise the subject

performed, how many times per week, and how long each session was. As the literature was reviewed relative to adherence and dropout, it was noted that there is wide variation in the definition of adherence. Definitions include attendance at CR exercise program a certain number of times per week, percentage of sessions missed and attainment of a physiological parameter or behavior. It would be more meaningful when comparing studies if there were a commonly accepted definition of adherence.

Conclusion

The small sample size and resulting skewed population precludes any conclusion based on statistical analysis. However, the need still exists to determine what influences a patient's attitude toward health behaviors and what can be done to influence that attitude for positive outcomes. The health care team, including nurses have this and many other challenges to meet in the arena of patient education specific to CR. Convincing patients to invest in health promoting behaviors is becoming increasingly difficult. Patients length of stay in the hospital is becoming shorter and shorter, reducing the amount of time for education by nurses and other health team members. Insurance coverage for CR programs is variable, and the out of pocket cost is significant. Access to CR programs in rural areas is not consistent. Despite this list of barriers, there is still a population of patients that will adhere to the health behavior recommendations given to them. The important answer being sought is what makes these individuals different from individuals who do not adhere to recommendations. Do they perceive more benefits and fewer barriers? Do they have higher levels of SE? Or is there something else? Continued studies in this area can

provide answers that will enhance our education and training process for CR, and result in a greater number of patients who are vested in the behaviors that can improve their health, and perhaps save their life.

APPENDIX

APPENDIX A

I.D. NO_____

CARDIAC EXERCISE HEALTH BELIEF SCALE

This is a questionnaire designed to determine the way in which different people view certain issues related to exercise and heart disease. The questionnaire includes belief statements with which you may agree or disagree. Read each statement carefully, then CIRCLE the letter(s) to the left of the item which most closely represents your personal beliefs. This is a measure of your personal beliefs. There are no right or wrong answers.

The letter(s) to the left of each statement stand for the following responses:

SD	Strongly Disagree
D	Disagree
N	Neutral
A	Agree
SA	Strongly Agree

In this questionnaire:

HEART DISEASE includes any of the following: myocardial infarction (heart attack), angina (chest pain with exertion), and coronary artery bypass graft (CABG).

CARDIOVASCULAR EXERCISE is exercise that keeps your heart rate raised for twenty to thirty minutes and is performed three to four times a week.

EXERCISE when used in this questionnaire means cardiovascular exercise.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
SD	D	N	A	SA	1.	I feel exercising regularly will strengthen my heart muscle.
SD	D	N	A	SA	2.	Exercising regularly helps to keep my arteries open.
SD	D	N	A	SA	3.	I feel exercising regularly is vital for my health.
SD	D	N	A	SA	4.	Exercising regularly reduces my risk of another heart problem.
SD	D	N	A	SA	5.	I can slow the progression of my heart disease by exercising regularly.
SD	D	N	A	SA	6.	When I exercise regularly I feel good about myself.
SD	D	N	A	SA	7.	Exercising regularly reduces my risk of future heart problems by helping me control stress.
SD	D	N	A	SA	8.	Exercising regularly reduces my risk of future heart problems by helping me lose weight.
SD	D	N	A	SA	9.	I feel better when I exercise regularly.
SD	D	N	A	SA	10.	My family feel my exercise program is important in reducing my risk of future heart problems.
SD	D	N	A	SA	11.	I am not strong enough to exercise regularly.
SD	D	N	A	SA	12.	Exercising regularly can be time consuming.
SD	D	N	A	SA	13.	Exercising regularly requires starting a new habit which is difficult.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
SD	D	N	A	SA	14.	I dislike exercising regularly.
SD	D	N	A	SA	15.	There is no place for me to exercise regularly.
SD	D	N	A	SA	16.	I am too busy to exercise regularly.
SD	D	N	A	SA	17.	I dislike exercising regularly because it makes me sweat.
SD	D	N	A	SA	18.	I am afraid I will have symptoms such as chest pain or shortness of breath if I exercise regularly.
SD	D	N	A	SA	19.	Exercising regularly interferes with other activities I do.
SD	D	N	A	SA	20.	I do not have anyone to exercise regularly with me.
SD	D	N	A	SA	21.	My family and friends think I am foolish to exercise regularly since I had my heart problem.

Please review all questions one more time to make sure ALL questions have been answered.

McGinn, V. (1995). Development and evaluation of the cardiac exercise health belief scale. Unpublished Master's thesis, Grand Valley State University, Allendale, MI. Used with permission.

APPENDIX B

I.D. NO_____

CARDIAC EXERCISE SELF-EFFICACY SCALE

We are interested in learning how confident you feel about doing the following activities. Everyone has different experiences which will make each person more or less confident in doing the following things. Thus, there are no right or wrong answers to this questionnaire. It is your opinion that is important. In this questionnaire, EXERCISE means activity that keeps your heart rate raised for twenty to thirty minutes and is performed three to four times per week. Place your "X" anywhere on the answer line that you feel best describes your confidence level.

<u>If it is recommended that you do any of the following THIS WEEK, how confident or certain would you be that you could:</u>

1. begin a new or different exercise program

   Not at all confident ——— Very confident

2. put forth the effort required to exercise

   Not at all confident ——— Very confident

3. change your exercise habits

   Not at all confident ——— Very confident

4. do exercises even if they are difficult

   Not at all confident ——— Very confident

5. exercise for the appropriate length of time

   Not at all confident ——— Very confident

6. do the type of exercises that you are suppose to do

Not at all confident ⟵ Very confident

Modified from Osteoporosis S-E Scale. Horan, M. L., Kim, K. K., Gendler, P., Froman, R. D., & Patel, M. D. (in press). Development and evaluation of the osteoporosis self-efficacy scale. Research in Nursing & Health. Used with permission.

APPENDIX C

I.D. NO_____

EXERCISE COMPLIANCE QUESTIONNAIRE

The following eight questions relate to the prescribed home exercise program outlined by the physical therapist before you were discharged from the hospital. Please look over each question carefully and respond by placing a check mark by one of the five possible responses that BEST describes how you exercise. Please CHECK ONLY ONE RESPONSE to each question. If you have stopped exercising, please answer the question FOR NON-EXERCISERS ONLY. Thank you.

1. How many times do you exercise (walk and/or bike) each week?

_____ 1. Fewer than 3 times a week
_____ 2. 3 times a week
_____ 3. 4 times a week
_____ 4. 5 times a week
_____ 5. More than 5 times a week

2. When you exercise (walk and/or bike), how long does this specific activity take you?

_____ 1. Less than 20 minutes
_____ 2. 20 to 29 minutes
_____ 3. 30 to 39 minutes
_____ 4. 40 to 49 minutes
_____ 5. 50 minutes or more

If you WALK ONLY, answer question #3. If you BIKE ONLY, answer question #4. If you BOTH WALK AND BIKE, answer questions #3 AND #4.

3. WALKERS – When you walk for exercise, approximately how fast do you go in miles per hour (mph)?

_____ 1. Less than 2 mph
_____ 2. 2 to 2.9 mph
_____ 3. 3 to 3.9 mph
_____ 4. 4 mph
_____ 5. More than 4 mph

4. BIKERS – When you bike for exercise, approximately how fast do you go in miles per hour (mph)?

_____ 1. Less than 5 mph
_____ 2. 5 to 5.9 mph
_____ 3. 6 to 7.9 mph
_____ 4. 8 mph
_____ 5. More than 8 mph

5. When you exercise, how often do you take your pulse before you warm up?

_____ 1. Never
_____ 2. Occasionally
_____ 3. Sometimes
_____ 4. Most of the time
_____ 5. Always

6. How often do you take you pulse after you cool down from exercise?

_____ 1. Never
_____ 2. Occasionally
_____ 3. Sometimes
_____ 4. Most of the time
_____ 5. Always

7. Did you exercise before your heart attack?

_____ 1. No
_____ 2. Yes, occasionally
_____ 3. Yes, 1 to 2 times per week
_____ 4. Yes, 3 to 4 times per week
_____ 5. Yes, more than 4 times per week

FOR NON-EXERCISERS ONLY

8. Did you ever start the exercise program recommended to you in the hospital?

_____ 1. Yes _____ 2. No

9. IF NO, please state:

Reason for not exercising_____

Modified from Radtke, K. L. (1989). Exercise compliance in cardiac rehabilitation. Rehabilitation Nursing, 14. Used with permission.

APPENDIX D

I.D. NO._____

DEMOGRAPHIC QUESTIONNAIRE

The following personal information is needed for our data analysis. This information is completely confidential. For each question, choose only ONE answer unless otherwise indicated.

1. What is your present age in years?_____years

2. What is your sex? ( ) 1. Male ( ) 2. Female

3. What is your present marital status?

( ) 1. Single
( ) 2. Married
( ) 3. Divorced
( ) 4. Separated
( ) 5. Widowed

4. Are you presently employed? ( ) 1. Yes ( ) 2. No

5. If employed, do you work ( ) 1. Full-time ( ) 2. Part-time

6. What is (or was) your occupation_____?
(Please specify)

7. What is your average household annual income?

( ) 1. Less than $10,000
( ) 2. $10,001 – 20,000
( ) 3. $20,001 – 30,000
( ) 4. $30,001 – 40,000
( ) 5. $40,001 – 50,000
( ) 6. $50,001 – 60,000
( ) 7. Greater than $60,000

8. What is the highest grade or year of school you have completed?

	Years completed PLEASE CIRCLE
None	00
Elementary	01 02 03 04 05 06 07 08
High School	09 10 11 12
College or technical school	13 14 15 16
Some graduate school	17
Graduate or professional degree	18

9. Which of the following personal behaviors or characteristics apply to you?

( ) 1. Smoking
( ) 2. Use a lot of table salt
( ) 3. Eat a diet high in fat
( ) 4. Overweight
( ) 5. Under a lot of stress

10. What race do you consider yourself to be?

( ) 1. Asian
( ) 2. Black
( ) 3. Caucasian
( ) 4. Hispanic
( ) 5. Native American
( ) 6. Other _____
Please specify

11. Do you have health insurance? ( ) 1. Yes ( ) 2. No

12. If you do have health insurance, what portion of a cardiac rehabilitation program does your insurance cover?

( ) 1. 0%	( ) 5. 40%	( ) 9. 80%
( ) 2. 10%	( ) 6. 50%	( ) 10. 90%
( ) 3. 20%	( ) 7. 60%	( ) 11. 100%
( ) 4. 30%	( ) 8. 70%	( ) 12. Unsure

13. Do you have any physical limitations which prevent you from participating in CARDIOVASCULAR exercise? Cardiovascular exercise is exercise that keeps your heart rate raised for twenty to thirty minutes and is performed three to four times per week.

( ) 1. Yes ( ) 2. No

If yes, please describe you physical limitations: _____

_____

_____

14. On what date were you discharged from the hospital?_____

15. Is this your first time in a cardiac rehabilitation program?

( ) 1. Yes ( ) 2. No

16. Have you participated in, or had exposure to any other type of exercise program?

( ) 1. Yes ( ) 2. No

If yes, please describe _____

Modified from Foster, M. (1995). The relationship of health beliefs to adherence to cardiac exercise following a cardiac event. Unpublished Master's thesis, Grand Valley State University, Allendale, MI.

APPENDIX E

Information and Informed Consent for Research Project Participants

The purpose of the study in which you are being asked to participate is to examine the health beliefs of individuals with heart disease and how they take care of themselves. The knowledge gained will help nurses and physicians provide health care in a manner that will be more in tune to the needs of men and women experiencing coronary artery disease.

Kristi Bianconi, R.N. is conducting this study, and part two will be conducted by Jill Stone, R.N. as course work in completion of a Master of Science degree in nursing through Grand Valley State University. Any questions can be directed to the investigator, Kristi Bianconi at 454-5551. In addition, concerns may also be addressed to Dr. Robert Hendersen, chairman of the Human Research Review Committee or Dr. Charlotte Torres, thesis chairman. Dr. Hendersen may be reached at 895-2195. Dr. Torres may be reached at 895-3873, or via mail at 227 Henry Hall, Grand Valley State University.

I also understand that:

1. participation in this study will involve completion of questionnaires sent to me by mail 6-12 weeks after discharge from the hospital and again after three months.
2. I will be asked questions about my adherence to my exercise program, beliefs about my heart condition, how confident I feel about performing the exercises, and general demographic information.
3. I have been selected for participation because I am enrolled in a Cardiac Rehabilitation home exercise program.
4. it is not anticipated that this study will lead to any physical or emotional risk to my family or myself.
5. the information I provide will be kept strictly confidential and only the investigators will have access to the data; no individual names will be used in publication.
6. a summary of the results will be made available to me upon my request to the researcher.
7. I will be one of approximately 60 participants in this study.

I acknowledge that:

I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction.

In giving my consent, I understand that my participation in the study is voluntary and that I may withdraw at any time using the postcard provided by Kristi

Bianconi without affecting the care I receive from my physician or the staff at Grand Valley Cardiology Specialists, P.C.

The investigator, Kristi Bianconi, R.N. has my permission to review the medical record held by Grand Valley Cardiology Specialists, P.C. for the purpose of confirming diagnosis, date of illness, and to ensure that there is no other medical problems that would make me ineligible for this study.

In three months I will be contacted by master's student Jill Stone, R.N., requesting my participation in part two of this study.

I have received a copy of this consent form.

My signature below indicates that I have read and understand the above information, and that I agree to participate in this study.

_____	_____
Participant Signature	Witness
_____	_____
Date	Date

_____ I am interested in receiving a summary of the study results.

LIST OF REFERENCES

List of References

Ades, P. A., Waldmann, M. L., McCann, W. J. & Weaver, S. O. (1992). Predictors of cardiac rehabilitation participation in older coronary patients. Archives of Internal Medicine, 152, 1033-1035.

American Heart Association. (1998). 1998 heart and stroke statistical update. Dallas, TX: Author.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.

Becker, M. H. (1974). The health belief model and sick role behavior. Health Education Monographs, 2, 409-419.

Becker, M. H. (1985). Patient adherence to prescribed therapies. Medical Care, 23, 539-555.

Canupp, K. C., Waites, K. B., DeVivo, M. J. & Richards, J. S. (1997). Predicting compliance with annual follow-up evaluations in persons with spinal cord injury. Spinal Cord, 35, 314-319.

Champion, V. L. (1984). Instrument development for health belief model constructs. Advances in Nursing Science, 6(3), 73-85.

Champion, V. L. (1987). The relationship of breast self-examination to health belief model variables. Research in Nursing & Health, 10, 375-382.

Comoss, R. M. (1988). Nursing strategies to improve compliance with life-style changes in a cardiac rehabilitation population. The Journal of Cardiovascular Nursing, 2(3), 23-36.

Conn, V. S. (1998). Older Adults and Exercise. Nursing Research, 47, 180-189.

Dai, Y. –T., & Catanzaro, M. (1987). Health beliefs and compliance with a skin care regimen. Rehabilitation Nursing, 12, 13-16.

Desharnais, R., Bouillon, J., & Godin, G. (1986). Self-efficacy and outcome expectations as determinants of exercise adherence. Psychological Reports, 59, 1155-1159.

Foster, M. (1995). The relationship of health beliefs to adherence to cardiac exercise following a cardiac event. Unpublished Master's thesis, Grand Valley State University, Allendale, MI

Hellman, E. A. (1997). Use of the stages of change in exercise adherence model among older adults with a cardiac diagnosis. Journal of Cardiopulmonary Rehabilitation, 17, 145-155.

Hiatt, A. M., Hoenshell-Nelson, N., & Zimmerman, L. (1990). Factors influencing patient entrance into a cardiac rehabilitation program. Cardiovascular Nursing, 26(5), 25-29.

Horan, M. L., Kim, K. K., Gendler, P., Froman, R. D. & Patel, M. D. (1998). Development and evaluation of the osteoporosis self-efficacy scale. Research in Nursing and Health, 21, 395-403.

Janz, N. K. (1988). The health belief model in understanding cardiovascular risk factor reduction behaviors. Cardiovascular Nursing, 24, 39-41.

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. Health Education Quarterly, 11, 1-47.

Kim, K. K., Horan, M. L., Gendler, P., & Patel, M. K. (1991). Development and evaluation of the osteoporosis health belief scale. Research in Nursing & Health, 14, 155-163.

Kison, C. (1992). Health beliefs and compliance of cardiac patients. Applied Nursing Research, 5, 181-185.

LaFontaine, T. (1995). The role of lipid management by diet and exercise in the progression, stabilization, and regression of coronary artery atherosclerosis. Journal of Cardiopulmonary Rehabilitation, 15, 262-268.

Malloy, M. J. (1993). Effects of exercise on coronary atherosclerotic lesions. Journal of the American College of Cardiology, 22, 478-479.

McGinn, V. (1995). Development and evaluation of the cardiac exercise health belief scale. Unpublished Master's thesis, Grand Valley State University, Allendale, MI.

Mirotznik, J., Feldman, L., & Stein, R. (1995). The health belief model

and adherence with a community center-based, supervised coronary heart disease exercise program. Journal of Community Health, 20, 233-247.

Muench, J. (1987). Health beliefs of patients with coronary heart disease enrolled in a cardiac exercise program. Journal of Cardiopulmonary Rehabilitation, 7, 130-135.

National Cholesterol Education Program (NCEP). (1993). Summary of the second report of the NCEP expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel II). Journal of the American Medical Association, 269, 3015-3023

Nelson, J. P. (1991). Perceived health, self-esteem, health habits, and perceived benefits and barriers to exercise in women who have and who have not experienced stage I breast cancer. Oncology Nursing Forum, 18, 1191-1197.

Oldridge, N. B., Guyatt, G. H., Fischer, M. E. & Rimm, A. A. (1988). Cardiac experience of randomized clinical trials. Journal of the American Medical Association, 260, 945-950.

Oldridge, N. B. & Streiner, D. L. (1990). The health belief model: predicting compliance and dropout in cardiac rehabilitation. Medicine and Science in Sports and Exercise, 22, 678-683.

Oldridge, N. B. (1991). Compliance with cardiac rehabilitation services. Journal of Cardiopulmonary Rehabilitation, 11, 115-127.

Ornish, D., Brown, S. E., Scherwitz, L. W., Billings, J. H., Armstrong, W. R., Ports, T. A., McLanahan, S. M., Kirkeeide, R. Ll., Brand, R. J., & Gould, K. L. (1990). Can lifestyle changes reverse coronary heart disease? Medical Science, 336, 129-133.

Pham, D. T., Fortin, F. & Thibaudeau, M. F. (1996). The role of the health belief model in amputees' self-evaluation of adherence to diabetes self-care behaviors. The Diabetic Educator, 22, 126-132.

Perkins, S. B. & Jenkins, L. S. (1998). Self-efficacy expectation, behavior performance, and mood status in early recovery from percutaneous transluminal coronary angioplasty. Heart & Lung, 27, 37-46.

Radtke, K. L. (1989). Exercise compliance in cardiac rehabilitation. Rehabilitation Nursing, 14, 182-186.

Robertson, D., & Keller, C. (1992). Relationships among health beliefs, self-efficacy, and exercise adherence in patients with coronary artery disease. Heart & Lung, 21, 56-63.

Rosenstock, I. M. (1974). Historical origins of the health belief model. Health Education Monographs, 2, 328-335.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. Health Education Quarterly, 15, 175-182.

Sass, J., Bertolone, K., Denton, D. & Logsdon, D. (1995). Exposure to blood and body fluid: Factors associated with non-compliance in follow up HIV testing among health care workers. American Association of Occupational Health Nursing, 43, 507-513.

Schuler, G., Hambrecht, R., Schierf, G., Niebauer, J., Hauer, K., Neumann, J., Hoberg, E., Drinkmann, A., Bacher, F., Grunze, M., & Kubler, W. (1992). Regular physical exercise and low-fat diet: Effects on progression of coronary artery disease. Circulation, 86, 1-11.

Strecher, V. J., DeVellis, B. M., Becker, M. H., & Rosenstock, I. M. (1986). The role of self-efficacy in achieving health behavior change. Health Education Quarterly, 13, 73-91.

Sytkowski, P. A., Kannel, W. B., & D'Agostino, R. B. (1990). Changes in risk factors and the decline in mortality from cardiovascular disease: The framingham heart study. The New England Journal of Medicine, 322, 1635-1640.

Taggart, H. M.& Connor, S. E. (1995). The relation of exercise habits to health beliefs and knowledge about osteoporosis. Journal of American College Health, 44, 127-130.

Tirrell, B. E., & Hart, L. K. (1980). The relationship of health beliefs and knowledge to exercise compliance in patients after coronary bypass. Heart & Lung, 9, 487-493.

Yeomans-Kinney, A., Vernon, S. W., Frankowski, R. F., Weber D. M., Bitsura, J. M., & Vogel V. G. (1995). Factors related to enrollment in the breast cancer prevention trial at a comprehensive cancer center during the first year of recruitment. Cancer, 76, 46-56.