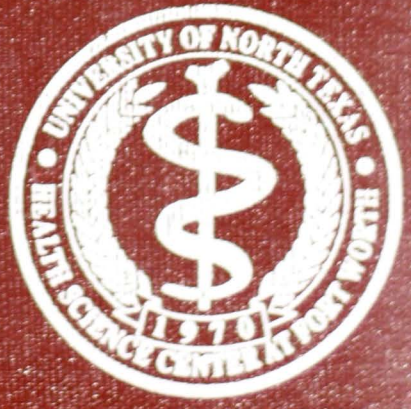

UNIVERSITY OF NORTH TEXAS
HEALTH SCIENCE CENTER AT FORT WORTH
1970

Spranger, Catherine Borski, Examining the Theoretical Constructs of Motivational Interviewing: Applying Self-Determination Theory to Physical Activity Among Heart Failure Patients. Doctor of Public Health (Social and Behavioral Sciences), May, 2008, 90 pp., 8 tables, reference list, 61 titles.

Effective management of heart failure (HF) is one of the major challenges facing health care providers today due to the complexity of a number of inter-related health and self-care behaviors. One health behavior that is important in the management of HF is physical activity. Motivational Interviewing (MI) has been shown to be an effective counseling style engaging individuals to both adopt and maintain regular physical activity; however, the literature is lacking in this area among HF patients. One underlying theoretical basis of MI that has been proposed is Self-Determination Theory (SDT). The purpose of this pilot study was to explore the relationships between physical activity and the SDT constructs of autonomous motivation, perceived competence, and autonomy support. The sample consisted of 26 HF patients in a heart failure clinic in north central Texas. Participants completed an interviewer-administered questionnaire examining various psychological constructs, as well as, assessing their level of physical activity during a typical week during the preceding month. The findings of this study lend some support to better understanding the relationships between specific SDT constructs and physical activity. Likewise the findings demonstrated the importance of motivation-related variables to understanding how to motivate HF patients to both initiate physical activity and maintain a regular physical activity regimen.

EXAMINING THE THEORETICAL CONSTRUCTS OF MOTIVATIONAL INTERVIEWING: APPLYING SELF-DETERMINATION THEORY TO PHYSICAL ACTIVITY AMONG HEART FAILURE PATIENTS

Catherine Borski Spranger, MPH

APPROVED:

Shaun Jeffrey, PhD
Major Professor

PhD
Committee Member

Nancy L. Feeney PhD, RN, ACNP-BC
Committee Member

Claudia S. Coggin, PhD, CHES
Committee Member

Department Chair

Dean, School of Public Health

EXAMINING THE THEORETICAL CONSTRUCTS OF MOTIVATIONAL INTERVIEWING: APPLYING SELF-DETERMINATION THEORY TO PHYSICAL ACTIVITY AMONG HEART FAILURE PATIENTS

DISSERTATION

Presented to the School of Public Health

University of North Texas

Health Science Center at Fort Worth

in Partial Fulfillment of the Requirements

for the Degree of

Doctor of Public Health

By

Catherine Borski Spranger, MPH

Fort Worth, Texas

May 2008

ACKNOWLEDGEMENTS

I acknowledge my debt to the love of my life, Rob, who has given so much and asked so little in return during this six year journey. And the little girl who makes my world turn, Emma. They, along with my parents, my sister, my brother, and my mother and father-in-law have provided love, support and encouragement to achieve my best. Their belief in me has never wavered, even when my own faltered.

With great sadness I bid farewell to my mother-in-law, Nancy Spranger, during this journey. I dedicate this dissertation to you 'GaGa'. You are loved and missed.

A special thank you to Valerie Copeland, Ph.D., friend and colleague. Without her support, attainment of my goal of obtaining my DrPH would have been far more difficult to achieve. To my special friends and colleagues who also gave me the encouragement to achieve my goals. These friends will never be forgotten.

Finally, to my dissertation committee, Shawn Jeffries, Ph.D., Sejong Bae, Ph.D., Claudia Coggin, Ph.D., and Nancy Tierney, Ph.D.. Thank you for your guidance and support.

Thanks to family, friends, and faith, I finally made it.

TABLE OF CONTENTS

LIST OF TABLES

Table

CHAPTER 1

INTRODUCTION

Effective management of heart failure (HF) is one of the major challenges facing health care providers today. Effecting approximately five million people in the United States, HF is a major cause of morbidity, reduced quality of life, and increased health care costs. Heart failure is a syndrome in which the heart fails to pump effectively enough to meet the body's circulatory and metabolic needs. There are a variety of factors that can contribute to the development of HF, including: long-standing hypertension, coronary artery disease, diabetes, smoking, obesity, high cholesterol levels, valvular defects, and congenital heart disease (Werner & Benjamin, 1998).

Management of HF is comprised of a number of inter-related health and self-care behaviors (Dickstein & Jaarsma, 2005). One health behavior that is important in the management of HF is physical activity. As with healthy populations, a range of physical and psychological benefits exist for individuals with HF who engage in regular physical activity. Despite the many benefits of physical activity and the more than 10 years that have passed since the American College of Sports Medicine (ACSM) and the Centers for Disease Control and Prevention (CDC) published national guidelines on physical activity and public health, roughly half of United States adults still do not engage in a level of physical activity consistent with physical recommendations, and almost 30% of Americans are sedentary (Haskell, et al, 2007). In the midst of an obesity epidemic that is a fundamental element of burden for numerous chronic medical conditions, including

HF, there is added impetus to research non-pharmacological interventions. One such intervention is Motivational Interviewing (MI).

Statement of the Purpose

Motivational interviewing has been shown to be an effective counseling style among a variety of populations (Markland, Ryan, Tobin, & Rollnick, 2005), in both engaging individuals to adopt and maintain regular physical activity; however, the literature is lacking in this area among HF patients. One underlying theoretical basis of MI that has been proposed is Self-Determination Theory (SDT). Exploration of the SDT constructs of autonomous motivation, perceived competence, and autonomy support (i.e. relationship with Health Care Provider) may lead to better MI with HF patients. The purpose of this study was to explore the relationships between the various SDT constructs and physical activity.

Research Hypotheses

Specifically it was hypothesized that:

1) Patients' perceived autonomy support for physical activity will be associated with internal motivation for physical activity.
2) Internal motivation for physical activity will be associated with levels of recreational physical activity.
3) Patients' perceived autonomy support for physical activity will be associated with perceived competence for physical activity.
4) Perceived competence will be associated with levels of recreational physical activity.

5) The relationship between patients' perceived autonomy support for physical activity and recreational physical activity will be mediated by internal motivation and perceived competence.

6) Self-efficacy for physical activity will be associated with perceived competence for physical activity.

7) Internal motivation and perceived competence for physical activity will be associated.

Delimitations

This study was delimited by patients being eligible to participate if they met the following three criteria:

1) Diagnosed with heart failure (HF) based on a systolic dysfunction (left ventricular ejection fraction (LVEF) $\leq 40\%$ with New York Heart Association (NYHA) Class II symptoms; slight limitation of physical activity or Class III symptoms; marked limitation of physical activity)

2) Able to understand, write, and speak English

3) Willing to give informed consent to participate in the study.

This study was a cross-sectional exploratory design; therefore no other delimitations were identified. Also due to the nature of this study we did not plan to control variables; however we did utilize statistical controls during our analyses of the data.

Limitations

This study utilized a sample of convenience, or purposeful sample. Participants were selected from the Heart Failure Clinic of the University of North Texas Health Science Center (UNTHSC) Patient Care Center (PCC) at Fort Worth. Because a purposeful sample lacks randomization, the investigators were not able to generalize the outcomes of this study to the entire population.

Assumptions

For the purposes of this study, the following assumptions were made:

1) When responding to questions regarding the theoretical constructs and levels of physical activity, participants would respond honestly.
2) Participation was voluntary; therefore participants were willingly doing so.

Definition of the Terms

Heart Failure – a clinical syndrome or a group of symptoms, where the heart cannot pump enough blood and oxygen to meet the needs of other body organs (Alexander, Schlant, Fuster, O'Rourke, Roberts, & Sonnenblick, 1999).

Perceived Autonomy Support (relationship with health care provider) – patients' perceptions of the degree to which their (specific) physician is autonomy supportive, (thus allowing the researcher to explore the relationship between physician's interpersonal style and their patients' motivation, behavior, and health; Deci & Ryan, 2000)

Autonomous Motivation – the degree to which people choose actions at the highest level of consideration and initiate the actions with a full sense of choice (Deci & Ryan, 2000)

Perceived Competence – based on an individual's experiences and beliefs that he or she can produce a desired outcome; the degree to which patients are confident about being able to make or maintain a change (Deci & Ryan, 2000)

Self-Efficacy – refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments in the face of specific barriers (Bandura, 1997)

Physical Activity – "any bodily movement that is produced by the contraction of skeletal muscles and that substantially increases energy expenditure" (USDHHS, 1996; USDHHS, 2002).

Household (domestic) – light and moderate household chores, yardwork, and caretaking

Exercise – brisk walking, running, vigorous aerobics, cycling, pool exercise, stretching, yoga, and swimming (laps only)

Recreational – leisurely walking, dancing, bowling, billiards, golf, racquet sports (tennis, racquet ball) and needlework

Exercise - is usually considered a subset of physical activity, and is traditionally defined as "planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness" (USDHHS, 1996, USDHHS, 2002).

Physical fitness –" a set of attributes that persons have or achieve that relates to the ability to perform physical activity" (USDHHS, 1996; USDHHS, 2002).

Importance of the Study

One of the most important aspects of managing patients with HF is improving their exercise tolerance so as to improve their quality of life. Although HF is nondiscriminatory of age, the largest prevalence is among those 65 years of age and older (NHLBI Diseases and Conditions Index, 2007). In this age group, one fifth of all hospitalizations have a primary or secondary diagnosis of HF (NHLBI Congestive Heart Failure Data Fact Sheet, 2007). Given that older Americans are the least physically active of any age group and generate the highest expenditures for medical care it, is possible that increasing levels of physical activity could reduce medical expenditures in this group (Martinson, Crain, Pronk, O'Connor, & Maciosek, 2003). Because MI is a counseling style that can be performed by many types of health care providers in a variety of settings, this study has the potential to have a tremendous public health impact on the further expansion of HF as a new epidemic. The magnitude of the problem of HF is large now, but it is expected to get worse because: (1) as more and more cardiac patients are able to survive and live longer with their disease, their opportunity for developing HF increases; (2) future growth in the elderly population will likely result in increasing numbers of persons with this condition regardless of trends in coronary artery disease morbidity and mortality (NHLBI Congestive Heart Failure Data Fact Sheet, 2007). Furthermore, in review of the current literature, no study has examined the theoretical constructs of MI by applying SDT to physical activity among HF patients.

CHAPTER 2

LITERATURE REVIEW

Heart Failure

Heart failure comes in three varieties. *Left heart failure*, also known as congestive heart failure, occurs when the left side of the heart is badly impaired in its function. A backup of congestion in the pulmonary circuit leads to the seepage of fluid back into the air sacs of the lungs. This condition, if it becomes severe and is not corrected, will result in pulmonary edema. Other signs and symptoms of left HF include dyspnea/orthopnea, diaphoresis, crackles/wheezes, cyanosis, and dysrhythmias. *Right heart failure*, also known as cor pulmonale, is most commonly caused by left HF. It also commonly results from pulmonary disease and high vascular resistance in the lungs. This backup or difficulty in pumping blood through the pulmonary circuit is felt through the rest of the body with symptoms including severe edema, especially in the legs, jugular venous distention, bounding pulses, increased heart rate, and decreased appetite. *Biventricular heart failure* occurs when both the right and left side fail simultaneously. Symptoms incorporate both left and right side signs. For patients in which the condition shows no improvement with conventional therapies (drugs or surgery), a heart transplant may be considered (Werner & Benjamin, 1998; Sole, Lamborn & Hartshorn, 2001).

To diagnose heart failure, a physician may order a number of tests, many of which are painless and simple. The most important of these tests is an echocardiogram which informs the physician of the patient's current ejection fraction (EF). The ejection fraction is a measurement of how well the heart is pumping. In cardiac physiology, this

is the percentage of the blood emptied from the ventricle during systole (heart at work) (Thomas, 1997). People with a healthy heart usually have an EF of 50% or greater, while most people, but not all, with heart failure have an ejection fraction of 40% or less (Sole, Lamborn, & Hartshorn, 2001).

Utilizing the New York Heart Association (NYHA) functional classification system, physicians are able to assess patients' level of disability or function and thereby determine the best course of therapy. This functional classification system relates symptoms to everyday activities and the patient's quality of life. Within this system there are four classes: *Class I (Mild)* – No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, shortness of breath, or heart palpitations. *Class II (Mild)* – Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, shortness of breath, or heart palpitations. *Class III (Moderate)* – Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, shortness of breath, or heart palpitations. *Class IV (Severe)* – Unable to carry out any physical activity without discomfort; symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased (Heart Failure Society of America, 2006).

Heart failure is a major cause of morbidity, reduced quality of life, and increased health care costs affecting approximately five million people in the United States (National Heart Lung and Blood Institute, Diseases and Conditions Index, 2006). Almost half of those individuals affected are diagnosed with biventricular heart failure. In addition, each year roughly 550,000 new cases of HF are diagnosed and almost 300,000

people die as a result of HF (American Heart Association, 2006; NHLBI Diseases and Conditions Index, 2006). The estimated direct cost for heart failure in 2006 was $29.6 billion in the United States (American Heart Association, 2006).

Among patients 65 years of age and older, heart failure is the most common reason for hospitalization and is the third most frequent medical diagnosis of Medicare home health care patients (Elixhauser, Yu, Steiner, & Bierman, 2000; Centers for Disease Control and Prevention, 2004). The number of persons who suffer from HF is expected to increase as the population ages and more people survive cardiac disease (American Heart Association, 2006; NHLBI Diseases and Conditions Index, 2006). This implies a further expansion of the HF epidemic in the near future (Stewart, MacIntyre, Capewell, & McMurray, 2003; Clark, McLennan, Dawson, Wilkinson, & Stewart, 2004).

Heart failure symptoms are associated with declines in physical function, emotional well-being, and increased health care utilization (NHLBI Diseases and Conditions Index website, 2006). Management of HF is comprised of a number of inter-related health and self-care behaviors. One health behavior of prime importance in the management of HF is physical activity (Mondoa, 2004).

Physical Activity and Heart Failure

As with healthy populations, a range of physical benefits exist for individuals with HF who engage in regular physical activity. These benefits include an increase in maximal exercise capacity, and decreased levels of fatigue and dyspnea. In addition to positive physical effects, HF patients also reap psychological benefits from regular physical activity, including improved mood and quality of life (Mondoa, 2004).

Despite this, physical activity or exercise training in patients with HF is not widely utilized. Perhaps this is because data on its effect on survival are not compelling (ExTraMATCH Collaborative, 2004), or there is complacency towards the implementation of many valid non-pharmacological treatments by physicians. Or perhaps, moreover, there is low compliance on the part of patients who are told by their health care providers to engage in physical activity (Mondoa, 2004).

One barrier not commonly reported for those individuals seeking to improve their physical activity level is confusion with the requisite levels of physical activity needed in order to obtain physical and psychological benefits (Leenders, Sherman, & Nagaraja, 2000). The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) recommend that all healthy adults aged 18 to 65 years engage in at least 30 minutes of moderate-intensity aerobic (endurance) physical activity on five days each week or vigorous-intensity aerobic physical activity for a minimum of 20 minutes on three days each week to have a beneficial effect on their health (Haskell, et al., 2007). The recommendation for older adults (men and women 65 years and older and adults age 50 to 64 years with clinically significant chronic conditions and/or functional limitations) is similar to that for healthy adults, but also includes the recommendation that intensity of aerobic activity takes into account the older adult's aerobic fitness; activities that maintain or increase flexibility; and balance exercises for those older adults at risk for falls (Nelson, et al., 2007). In addition, the promotion of physical activity in older adults should emphasize moderate-intensity physical activity, muscle-strengthening activity, reducing sedentary behavior, and risk management (Nelson, et al., 2007).

Despite the fact that more than 10 years that have passed since the ACSM and the CDC, along with support from the American Heart Association, published national guidelines on the types and amounts of physical activity needed to improve and maintain health, the United States population remains largely sedentary. The purpose of these original guidelines was to provide a "clear, concise, public health message" (Haskell, et al., 2007, p. 1423) that would "encourage increased participation in physical activity" (Haskell, et al., 2007, p. 1423). Yet, many lay individuals still may not completely understand the differences between physical activity, exercise, and other similarly sounding concepts. Therefore, it is important in a discussion of physical activity to differentiate the various categories of scientific terminology.

Terminology

A critical issue and one of the inherent challenges in the exercise research field remains the manner in which exercise behavior is defined and measured. Thus, it is important to distinguish between the terms *sedentary lifestyle, physical activity, exercise,* and *physical fitness.* A *sedentary lifestyle* is defined as "engaging in no leisure-time physical activity (exercises, sports, physically active hobbies) in a two-week period" (USDHHS, 2002). *Physical activity* has been defined as "any bodily movement that is produced by the contraction of skeletal muscles and that substantially increases energy expenditure" (USDHHS, 1996; USDHHS, 2002). Three generally accepted forms of physical activity cited in the literature that meet the criteria for exercise include:

(1) *leisure-time physical activity* (i.e., walking, swimming, running, cycling);

(2) *occupational physical activity* (i.e., walking, standing, and lifting heavy objects);

(3) *housework-related physical activity* (i.e., light and moderate household chores). *Exercise* is usually considered a subset of physical activity, and is traditionally defined as "planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness" (USDHHS, 1996, USDHHS, 2002). *Physical fitness* is therefore defined as "a set of attributes that persons have or achieve that relates to the ability to perform physical activity" (USDHHS, 1996; USDHHS, 2002). Examples of such attributes include flexibility, muscle tone, and cardiovascular endurance.

Delineation between these terms provides researchers with the opportunity to more clearly develop specific measures to assess physical activity and successfully explore the connections to positive health outcomes. In addition, to determine the actual threshold level of physical activity necessary to obtain physical and psychological benefits, valid, reliable, and precise instruments are needed.

Assessment of Physical Activity/Exercise

Assessment of physical activity consists of multiple methods, with some of the most common being: direct observation, physical activity records, self-report questionnaires, motion sensors/monitors (e.g. pedometers, accelerometers) and physiological assessment techniques such as heart rate monitoring and doubly labeled water (calorimetry) (Melanson & Freedson, 1996; Westerterp, 1999; Leenders, Sherman, & Nagaraja, 2000; Strath, Bassett, Ham, & Swartz, 2003). Due to ease of administration and being relatively inexpensive, self-report of physical activity is a popular method of assessing physical activity. Furthermore, in recent years, standardization of interview techniques has occurred so different studies can be compared (Leenders, Sherman, &

Nagaraja, 2000). Although self-report of physical activity relies on: (1) accurate subject recall of physical activity, (2) correct interpretation of recorded information by the interviewer, and (3) the use of formulas to convert the reported and interpreted physical activity into energy expenditure, research has shown that self-report questionnaires possess adequate reliability and good association with outcome measures of health status (Leenders, Sherman, & Nagaraja, 2000; Strath, Bassett, Ham, & Swartz, 2003).

Assessment of physical activity, however, is only one piece of the puzzle regarding the requisite levels of physical activity needed in order to obtain physical and psychological benefits. The development of counseling methods to increase exercise behavior is best completed with the guidance of theoretical models and psychological constructs (Marcus, Selby, Niaura, & Rossi, 1992). One such construct of particular importance is that of self-efficacy.

Self-Efficacy

Self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments in the face of specific barriers (Bandura, 1997). Originally developed from Bandura's theory, (1982) self-efficacy is an essential component of undertaking a new activity and is considered by many researchers to be highly related to the actual performance and maintenance of that activity (Miller & Rollnick, 2002). According to Bandura, (1977) self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment. Unless people believe that they can complete a task and that completing this task can produce the outcomes they desire, they have little incentive to act or persevere in the face of

difficulties. Proponents of self-efficacy theory might suggest that in order to increase their physical activity, individuals who are mostly sedentary (including many HF patients) would first need to feel both confident that they could exercise and, furthermore, that exercise would make a positive difference in their lives.

Several forms of counseling and/or therapies have been developed to increase both individuals' levels of physical activity and their self-efficacy regarding this behavior. These have included interventions based the Transtheoretical Model (TTM; Marcus, Selby, Niaura, & Rossi, 1992) as well as, physician-based advice about an activity (verbal advice, leaflets about the benefits, etc.; Pinto, Goldstein, & Marcus, 1998). However, one of the increasingly popular and efficacious forms of counseling patients regarding exercise behavior is Motivational Interviewing.

Motivational Interviewing

Motivational interviewing (MI) is a method of counseling patients in which the patient is empowered to feel more confident about physical activity and thus begins to develop strategies to increase their exercise. First described by William Miller (1983) as a therapeutic approach that evolved from his experience of treating alcoholism, MI has since been developed into a distinct style of counseling. MI has been defined as a "(patient)-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence" (Miller & Rollnick, 2002).

As it pertains to exercise behavior, the goal of MI is to help individuals explore and resolve their ambivalence regarding adherence to lifestyle exercise, to examine how their current health behavior may conflict with their own goals and values, and to choose

how to change their behavior. MI is essentially client-centered, meaning that the client takes responsibility for any potential changes. Therefore the emphasis is on helping patients to help themselves and thus, MI may be defined as two people (counselor or health care professional and patient) working together to meet needs of one person (patient). In contrast to many traditional interventions, MI counselors maintain a non-judgmental tone and do not offer advice unless solicited by the patient or permission is granted from the patient to do so. Utilizing a foundation of patient-centered counseling skills to help the patient voice discrepancy between where he or she is and the desired future, the counselor elicits "change talk" (Motivational Interviewing: Resources for Clinicians, Researchers, and Trainers; Miller & Rollnick, 2002). For example, a patient may talk about the disadvantages of the status quo, or may express hope about the ability to change.

Four basic principles underlie MI: expressing empathy, development of discrepancy, rolling with resistance, and support of self-efficacy. Each of these constructs will be reviewed in turn along with a brief discussion of their relationship to MI and exercise behavior.

Expressing Empathy

Although fundamental to almost all psychotherapies, expressing empathy in MI is the therapeutic skill of reflective listening or accurate empathy as described by Carl Rogers (1961), and is the foundation upon which MI is built. The attitude underlying this basic principle of empathy is client-centered acceptance, which facilitates change and

wherein patient ambivalence or reluctance to change is viewed as normal (Burke, Arkowitz, & Menchola, 2003; Miller & Rollnick, 2002).

As related to physical activity, the patient, when discussing his or her reluctance to change their exercise or physical activity habits, is accepted as they are by the counselor, be it sedentary or very physically active. This acceptance of people 'as they are' seems to facilitate change whereas nonacceptance tends to immobilize individuals.

Developing Discrepancy

The second basic principle of MI is developing discrepancy. Here, through the use of specific types of questions, along with selective reflections, the patient is directed toward the discrepancy between his or her present behavior and important personal goals or values. The patient presents the arguments for change, and is thus motivated by the perceived discrepancy that has been fostered (Burke, Arkowitz, & Menchola, 2003; Miller & Rollnick, 2002).

In the setting of physical activity, the counselor skillfully allows the patient to present arguments for change, which often involves the patient identifying and clarifying his or her own goals and values about physical activity. Because reducing a sedentary lifestyle is often seen as unpleasurable, helping the individual to reframe their change in positive terms—for example, what is gained versus what is lost—becomes the motivator for change.

Rolling with Resistance

The third basic principle of MI is rolling with resistance. Because it is the client who presents the reasons for change, new perspectives are invited, and rather than

opposing the client's resistance to change the counselor simply 'rolls with the resistance.' Resistance is a signal for the counselor to respond differently, and to avoid arguing for change (Burke, Arkowitz, & Menchola, 2003; Miller & Rollnick, 2002).

As the patient presents his or her reasons for changing their exercise behavior, the counselor provides the appropriate message of, "If you wish, I can help you change your current exercise behavior." Options are explored and the patient is invited to find the flaws in each idea until finally any resistance to change one's current sedentary lifestyle is reframed in a way that creates a new momentum toward change.

Supporting Self-Efficacy

The fourth basic principle of MI is to enhance the client's belief in his or her own capability to carry out and succeed with a specific task - to support their self-efficacy. It is the client, not the counselor, who is responsible for choosing and carrying out the change. However, the counselor's own beliefs about the client's ability to change can act as a self-fulfilling prophecy (Burke, Arkowitz, & Menchola, 2003; Miller & Rollnick, 2002).

Self-efficacy has been shown to have a positive impact on physical activity in healthy, sedentary adults, patients recovering from myocardial infarction and/or coronary artery bypass surgery, and in heart failure patients (Gortner & Jenkins, 1990; Oka, Gortner, Stotts, & Haskell, 1996). This suggests that interventions enhancing self-efficacy may expedite recovery (i.e., resume normal activities of daily living) and increase levels of physical activity in these groups. MI has been shown to be an effective

counseling style in both engaging individuals to adopt and maintain regular physical activity; however, the literature is lacking in this area among HF patients.

Research Involving MI and Exercise Behavior

Although much has been published regarding the success with MI to elicit behavior changes, the use of MI to encourage exercise is relatively new. Dunn and colleagues (2001) presented a comprehensive review of 29 MI randomized controlled trials that included three with exercise outcomes. Miller and Rollnick (2002) reported a meta-analysis of 26 controlled trials that used adaptation of motivational interviewing (AMI), one of which included a physical activity outcome. Results of this particular study by Harland and colleagues (1999) that aimed to increase physical activity without prescribing specific activities, showed significant and equivalent improvements in both AMI groups compared to the control group, but these gains were short-lived (i.e., sustained less than one year). Recent reports of MI adaptations to increase exercise in persons with diabetes (Kirk, Mutrie, MacIntyre, & Fisher, 2003; Di Loreto, Fanelli, Lucidi, Murdolo, De Cicco, Parlanti, et al., 2003) and in persons with congestive heart failure (Brodie & Inoue, 2005) demonstrate a growing interest in the use of MI to change exercise behavior.

Despite this growing interest in MI, criticisms of it being essentially atheoretical exist (Draycott & Dabbs, 1998). A systematic review by Dunn and colleagues (2001) found there exists a substantial amount of evidence that MI is an effective substance abuse intervention method, but that there are inadequate data to judge the effect of MI in other areas such as diet, physical activity, and smoking. Not only has little attention been

devoted to developing theoretical underpinnings to MI, but variability in study findings, heterogeneity of intervention, and lack of client characteristics related to effectiveness (Britt, Blampied, & Hudson, 2003) have all contributed to the unanswered questions of exactly how and why it can be effective in changing behavior, and for whom it is most effective (Markland, Ryan, Tobin, & Rollnick, 2005).

One underlying theoretical basis of MI that has been proposed is Self-Determination Theory (SDT). Exploration of the SDT constructs of autonomous motivation, perceived competence, and autonomy support (i.e. relationship with Health Care Provider) may lead to better MI with HF patients.

Self-Determination Theory

A consistent theme emerging from previous health behaviors research is that understanding an individual's cognitions and motivation is central to facilitating long-term behavior change (Roberts, 1992). Self-determination theory (SDT), conceptualized by Edward Deci and Richard Ryan (1985), is a theory of motivation and behavioral regulation that focuses on internalization and personality orientations within a social context (Markland, Ryan, Tobin, & Rollnick, 2005). Internalization is the process by which motivation for a behavior moves from more external regulation to more internal regulation. Personal orientation of a situation is personality orientation specific (Rose, Markland & Parfitt, 2001). Personality orientations are individual differences that describe the extent to which people choose to be autonomous, controlled or a part of the regulation of their behavior. Three orientations, referred to as causality orientations, have been identified: a) autonomy, b) control, and c) impersonal. An autonomy-oriented

individual seeks situations to express self-determining behavior and interpret situations as information from which to regulate chosen behaviors. Control-oriented individuals rely on internally imposed or external events to regulate their behavior. An external event may be a reward or deadline. The impersonal-oriented individual believes that behavior outcome is uncontrollable and feels a sense of helplessness (Williams, Grow, Freedman, Ryan, & Deci, 1996).

According to SDT, the social context mediates the amount and quality of internalization. An individual's social context may either be supportive and understanding, allowing for choices which would facilitate internalization of autonomy, or a controlling non-supportive social context that would not facilitate autonomous motivation (Williams, Grow, Freedman, Ryan, & Deci, 1996). An important construct that underlies SDT is the view of motivation as a continuum from amotivation (lack of motivation), to extrinsic motivation (externally controlled motivation), to intrinsic motivation (for the activity itself; Markland, Ryan, Tobin, & Rollnick, 2005).

A fundamental principle of SDT is that people have an innate tendency toward growth and improvement. In addition, individuals are considered proactive, and have three basic psychological needs that are innate, universal, and essential for health and wellbeing: autonomy, competence, and relatedness (Deci & Ryan, 2000). These three needs fuel individuals' attempts at internalizing and/or integrating their actions and experiences within a social environment (Markland, Ryan, Tobin, & Rollnick, 2005).

Autonomy is the degree to which people choose actions at the highest level of consideration and initiate the actions with a full sense of choice. Controlledness, the

degree to which one feels pressure from entities other than self, is on the opposite end of the continuum from autonomy. Guilt is one example of pressure originating from external sources that is considered to be controlling. Autonomous actions are considered more flexible and creative in nature than controlled actions (Deci & Ryan, 2000). The choice fullness or autonomy of a behavior change, together with the autonomous support provided by health care providers and others, is salient to the internalization process (Williams, Freedman, & Deci, 1998). In SDT studies autonomous support is accessed as a measure of perceived autonomy support.

Competence is based on an individual's experiences and beliefs that he or she can produce a desired outcome. SDT suggests that when personal trials are perceived as self-determined, i.e. autonomous, then perceived competence will be influenced, and motivation will likely become more internalized (Deci & Ryan, 2000; Markland, Ryan, Tobin, & Rollnick, 2005). In SDT studies competence is accessed as a measure of individuals' perceived competence.

Relatedness refers to individual's feelings of closeness to other people. Relatedness is considered to be bidirectional, in that one not only cares for, but also receives care. A given social context may provide relationships that vary in amount of supportiveness for the internalization of behavior and thus facilitate the behavior, becoming more internally regulated. Relatedness depends in part on finding personal value in everyday activities, and is associated with the emotional well being of an individual (Deci & Ryan, 2000).

The SDT model represents a process of change called internalization through which people take in and integrate the motivations and competencies for changing a particular behavior or goal (Deci, Eghrari, Patrick, & Leone, 1994). This continuum of self-determination or internalization guides motivation and behavior regulation from amotivation to intrinsic motivation. This is illustrated in the figure adapted from Biddle (1999) in Appendix A.

Amotivation is a term used to describe a lack of motivation in attempting a behavior. There are four types or levels of extrinsic motivation (external regulation, introjected regulation, identified regulation, and integrated regulation). Each type of extrinsic motivation possesses a different degree of internationalization as the continuum moves from less to more self-determined behavior. The lowest level of extrinsic motivation is referred to as simply external regulation and might be illustrated by the comment: "Okay, I'll go to the exercise class if I really must." This type of regulation is controlled by rewards or threats, such as coercion or pressure from a spouse, supervisor or other person of authority to an individual.

Introjected regulation is the next level of extrinsic motivation moving toward self-determination. Introjected regulation is illustrated by the statement: "I feel guilty if I do not exercise regularly." Introjection describes a partial or less than optimal level of internalization that results in a degree of internally controlled behavior regulation. When a person is acting from introjected internalization, the person values the actions but does not accept ownership. Guilt or promises of external rewards internally control an action that is introjectedly internalized.

Identified regulation is represented by the statement: "I must exercise to look better". This approaches self-determined motivation, and is sometimes referred to as the threshold of autonomy. The action is motivated by the outcome of participation in an activity, such as disease prevention or fitness improvement. The focus of identified regulation is on a product or an outcome.

Integrated regulation is considered the most self-determined form of behavior regulation. Integrated regulation is reflected in the statement: "I exercise because it is important to me, and it symbolizes who I am." The behavior becomes fully integrated into one's identity, and is important in relation to personal goals. Integration describes an optimal level of internalization that results in self-determined behavior regulation. Integration is predicted to occur in social contexts that support autonomy, whereas introjection is more likely to occur in non-autonomous supportive environments (Deci, Eghrari, Patrick, & Leone, 1994). Integrated regulation is not, however, truly intrinsic because it is not engagement for the pure enjoyment of the activity.

Intrinsic motivation, the highest level on the continuum of behavior regulation, occurs when the individual participates in the action for enjoyment and for the action itself (Biddle, 1999). As individuals move closer to intrinsic motivation, they possess stronger feelings of personal investment, autonomy, and self-identity. Truly intrinsic motivation occurs when the activity is valued as an end in itself and is operationalized in three forms: (a) to know, (b) to accomplish, and (c) to experience stimulation. Intrinsic motivation is illustrated by the statement: "I exercise for the pure enjoyment of doing so."

Commonalities between Motivational Interviewing and Self-Determination Theory

1. Autonomy (MI) & Intrinsic Motivation (SDT). The goals of MI as it pertains to exercise behavior are to help individuals explore and resolve their ambivalence regarding adherence to lifestyle exercise, to examine how their current health behavior may conflict with their own goals and values, and to choose how to change their behavior. The counselor respects the patient's own decision-making process. The counselor may have a differing perspective from the patient, and thus 'rolls with resistance'. Nonetheless, the counselor allows the patient to decide if, how, and when change will occur. Within the context of SDT, a similar yet distinct construct is intrinsic motivation. Intrinsic motivation occurs when an individual participates in the action for enjoyment and for the action itself, they possess stronger feelings of autonomy. The behavior is engaged in willingly, with no sense of coercion.

2. Self-Efficacy (MI) & Perceived Competence (SDT). In the setting of MI, the patient is helped to develop clear and realistic expectations about what behavior change could do for them; helped to formulate achievable goals; encouraged to believe that they are capable of engaging in appropriate behaviors. Discrepancies are developed and self-efficacy is supported. Within the context of SDT, a similar yet distinct construct is perceived competence. Perceived competence concerns the patients' need to experience confidence in their abilities and the capacity to affect outcomes.

These two commonalities of constructs provide ample justification for comparing MI and SDT. By exploring the theoretical constructs of MI in terms of SDT we hope to

gain an increased understanding of how and why MI could have increased effectiveness in empowering HF patients to adhere to exercise.

CHAPTER 3

METHODOLOGY

Population and Sample

Participants were selected from the Heart Failure Clinic and/or Outpatient Cardiology Clinics of the UNTHSC PCC between July 26, 2007 and November 30, 2007. Participants were males and females within the age range of 18 to ≥ 65 years of age, of all ethnicities, literate in English, and had diagnosed HF. Criteria for HF was based on a systolic dysfunction (left ventricular ejection fraction (LVEF)) ≤ 40% as determined by echocardiogram, with New York Heart Association (NYHA) Class II symptoms; slight limitation of physical activity or Class III symptoms; marked limitation of physical activity.

Recruitment

The HF nurse specialist reviewed 941 echocardiograms completed during the time period of August 1, 2006 through November 9, 2007. This review yielded a total of 44 potential participants meeting the defined criteria for HF. From this pool of eligible participants, participants were selected in one of two ways: (1) Cardiologists and the HF nurse specialist of the Heart Failure and/or Cardiology Outpatient Clinics of the UNTHSC PCC (here after to be referred to as cardiology staff) identified potential participants during outpatient visits who were then approached regarding their participation in this study and consented by one of two student investigators; (2) a pro-active recruitment letter was sent out to eligible participants identified by cardiology staff. The recruitment letter briefly explained the study and invited them to participate if

interested in doing so. Interested participants were to contact the HF nurse specialist who then scheduled an appointment to complete the study survey on/at the patient's next scheduled outpatient visit to the HF clinic or on a day one of the student investigators was available. If there was no reply in one week from those receiving the letters, a follow up phone call was made by the HF nurse specialist to verify receipt of the letter and determine if potential participants were interested in finding out more about the study.

Of the 44 patients meeting study criteria, six were actively recruited during their outpatient clinic visit while the remaining 38 were mailed recruitment letters. As illustrated in the recruitment algorithm (Appendix B), three of the six actively recruited during their clinic visit completed the interview; two were interested but due to decreased cognitive function they were unable to complete the interview; one declined to participate. Twenty three of the 38 to whom a recruitment letter was mailed followed by a follow up phone call completed the interview; two scheduled an interview but subsequently failed to show up for their appointment; two were interested in participating but due to transportation issues were unable to schedule an interview; four declined to participate; six were no response to letter or follow up phone call; and one was lost to follow up due to incorrect contact information.

The final sample consisted of 26 participants – 7 women, 19 men, with the diagnosis of HF based on a systolic dysfunction (LVEF) $\leq 40\%$ with NYHA Class II symptoms or Class III symptoms.

Protection of Human Participants

Risk and benefits (Appendix C) were explained to patients who met criteria defined for this study and an informed consent was obtained for patients willing to participate. The University of North Texas Health Science Center's Institutional Review Board approved the study prior to sample selection.

Data Collection Procedures

Data collection began in the summer, 2007. Data were collected between the hours of 8:00 am to 4:00 pm five days a week. The investigator met the participant in the HF/Cardiology clinic at the scheduled time of their interview or actively recruited the patient during their scheduled clinic visit (see Appendix B). Upon introductions each prospective participant was given an explanation of the purpose of the study (see Appendix C) and if agreeable to participate, informed consent (Appendix C) was obtained. Utilizing the HF nurse specialist office or the staff conference room located on the same floor of the UNTHSC PCC as the HF/Cardiology clinic, the investigator conducted an interviewer-administered questionnaire, reading the questions to the participant and recording their responses. In an attempt to reduce any possible ambiguity in questions, the investigator referred the participant back to the original question and the question was read to the participant again for clarification. To reduce the participant's stress/anxiety level, a set of cue cards (Appendix D) with the different response choices was given to them to look at as they were being interviewed. Interviews took approximately 30-60 minutes to complete.

Each survey was assigned a unique code prior to administration. The unique code corresponded to a master list of participant identifiers (name). No participant name or any other identifying number such as medical record number or social security number was included on the survey. Informed consent forms were separated from surveys to protect the identity of the participant.. Upon completion of the interview participants were compensated $15.00, in the form of a gift card, and the investigator thanked them for their participation. The completed surveys were locked in a file cabinet accessible only by the principal investigator. The principal investigator used the master list of participant identifiers to track identity of the survey participants. After completion of data analysis, the list of names was destroyed.

Instrumentation

The investigators developed a 94-item survey instrument by combining five separate, standardized questionnaires and one participant sociodemographic and clinical information questionnaire into one document (Appendix E). The five separate, standardized questionnaires consisted of the Health Care Climate Questionnaire (HCCQ), the Self Regulation Questionnaire for Exercise (SRQ-E), the Perceived Competence Scale (PCS), the Self-Efficacy Questionnaire for exercise (SEQ), and the YALE Physical Activity Survey (YPAS). No revisions were made to these original questionnaires. Each of these questionnaires is reviewed in turn.

Health Care Climate Questionnaire (HCCQ)

The original HCCQ is a 15-item measure that assesses patients' perceptions of the degree to which their specific physician or healthcare providers are autonomy supportive.

This assessment allows for the exploration of the relationship between physicians' interpersonal style and their patients' motivation, behavior, and health. It was validated in a study of patients visiting their primary care physicians and was first used in a published study of obese patients participating in a weight loss program (Williams, Grow, Freedman, Ryan, & Deci, 1996). Items are worded differently depending on the provider or context being assessed. Further, when it concerns treatment with respect to a specific issue or behavior—such as physical activity in this study—the wording is adjusted slightly to refer to the target issue or behavior. In each case the content of the items is the same except for these minor changes. The Cronbach's alpha for the 15 items has consistently been above 0.90 (Williams, Grow, Freedman, Ryan, & Deci, 1996). There is also a short form of the HCCQ that includes six of the 15 items. It is this shortened version of the scale that was used in this study. The Cronbach's alpha for the six item scale has consistently been about 0.82 (Williams, Freedman, & Deci, 1998).

Utilizing the HCCQ, the SDT construct of perceived autonomy support for physical activity was assessed. The HCCQ includes items such as "I feel that my health care providers have provided me with choices and options about exercising regularly." Responses were made on a 7-point Likert-type scale ranging from "Not at all true" to "Very true." The HCCQ scale was scored by averaging the individual item scores. The higher the average score, the higher the level of perceived autonomy support.

Self-Regulation Questionnaire for Exercise (SRQ-E)

The SRQ-E is one of three versions of the Self-Regulation Questionnaire. Each version of the scale, one each for working out, exercising regularly, and doing gymnastics, is slightly different from each other in terms of the questions asked. The SRQ-E concerns the degree to which one feels autonomous with respect to exercising or engaging in physical activity. To date no published research reports have used the SRQ-E. Gagne and colleagues (2003) utilized a version essentially the same, the Self-Regulation for Gymnastics with a Cronbach's alpha of 0.73. Although the three versions of the Self-Regulation Questionnaire were developed by different researchers, they appear to be wholly comparable scales (Ryan & Connell, 1989; Vallerand, Fortier, & Guay, 1997; Gange, Ryan, Bargmann, 2003).

Utilizing the SRQ-E, the SDT construct of internal motivation for physical activity was assessed. The SRQ-E includes items such as "I try to exercise on a regular basis because I enjoy exercising." Responses were made on a 7-point Likert-type scale ranging from "Not at all true" to "Very true." This questionnaire consists of 16 questions and has four subscales (external regulation, introjected regulation, identified regulation, and intrinsic motivation). For the purpose of this study, internal motivation was calculated as follows: (1) Individual subscale scores for identified regulation and intrinsic motivation were calculated by averaging the responses to each of the subscale's items. These individual subscale scores were then averaged together to create a score for internal motivation; (2) Individual subscale scores for introjected regulation, identified regulation, and intrinsic motivation were calculated by averaging the responses to each of

the subscale's items. These individual subscale scores were then averaged together to create a score for internal motivation; and (3) the Relative Autonomy Index (RAI) for this scale was calculated using the following formula to combine the subscale scores: 2 x Intrinsic + Identified – Introjected – 2 x External.

Perceived Competence Scale (PCS)

The PCS is a short four-item questionnaire that assesses the degree to which participants are confident or competent about being able to make or maintain a change toward a healthy behavior (i.e., physical activity in this study). People who feel more competent with regard to a particular behavior have been found to be more likely to make or maintain the change and reap the positive benefits. This scale has been used in several studies with a Cronbach's alpha between 0.80 and 0.94 (Williams, Weiner, Marakis, Reeve, & Deci, 1994; Williams & Deci, 1996; Williams, Freedman, & Deci, 1998).

Utilizing the PCS, the SDT construct of perceived competence was assessed. The PCS includes items such as "I feel confident in my ability to exercise regularly." Responses were made on a 7-point Likert-type scale ranging from "Not at all true" to "Very true." Scoring of the PCS consisted of taking the average of participants' responses to the four items. Higher scores equal a higher level of perceived competence.

Self-Efficacy Questionnaire for Exercise (SEQ)

The SEQ for exercise assesses participants' confidence regarding participation in regular exercise/physical activity in the face of specific barriers. Developed initially for sedentary adults in a community who participated in an outpatient exercise program including biking, rowing, and walking, the SEQ has demonstrated sufficient evidence for

reliability with a Cronbach's alpha of 0.93 (Marcus, Selby, Niaura, and Rossi, 1992; McAuley, Lox, & Duncan, 1993).

Utilizing the SEQ, the SDT construct of self-efficacy was assessed. The SEQ includes items such as "I am confident I can participate in regular exercise even when I feel tense or under stress." Responses were made on a 5-point Likert-type scale ranging from "Not at all confident" to "Completely confident." Scoring of the SEQ consisted of taking the average of participants' responses to the 18 items.
Higher scores equal a higher level of self-efficacy.

Yale Physical Activity Survey (YPAS)

The YPAS is a 39-item survey for assessing older adults' physical activity during a typical week in the preceding month. Correlation coefficients for reliability studies of the YPAS ranged from 0.42 ($p = 0.0002$) to 0.65 ($p = 0.0001$) while correlation coefficients for validation studies for the YPAS ranged from -0.47 ($p = 0.01$) to 0.60 ($p = 0.003$; DiPietro, Caspersen, Ostfeld, and Nadel, 1993). Specifically, the following three forms of physical activity were assessed: (1) *household physical activity* (i.e., light and moderate household chores, yardwork, and caretaking); (2) *exercise* (i.e., brisk walking, vigorous aerobics, cycling, and swimming); and (3) *recreational physical activity* (i.e., leisurely walking, dancing, bowling, golf, and needlework). Two summary indices (Total Time Summary Index and Energy Expenditure Summary Index) were calculated from the YPAS. Total Time Summary Index is the time spent for each activity on the checklist summed over all activities to create a total time summary index, expressed as hours per week for each subject. Energy Expenditure Summary Index is

time spent for each activity on the checklist multiplied by an intensity code (kcal/min; see instrument, Appendix E) and is summed over all activities to create a total energy expenditure index, expressed as kilocalories per week for each participant.

Independent/Dependent Variables and Covariates

Independent variables consisted of the SDT constructs of perceived autonomy support, internal motivation, perceived competence, and self-efficacy. A description of the independent variables and how each was measured follows: *Independent Variables* – (1) Perceived Autonomy Support (relationship with health care provider) for physical activity was assessed with the HCCQ. (2) Internal motivation for physical activity was assessed with the SRQ-E. (3) Perceived Competence for physical activity was assessed with the PCS. (4) Self-Efficacy for physical activity was assessed with the SEQ.

The dependent variable for this study was recreational physical activity (i.e., leisurely walking, dancing, bowling, golf, and needlework) as was assessed by the YPAS. Time spent for each recreational activity was multiplied by an intensity code (kcal/min; see instrument, Appendix E) and was then summed to create a total recreational energy expenditure index, expressed as kilocalories per week for each participant.

Covariates for this study consisted of sociodemographic and clinical information of participants. Variables included age, gender, ethnicity, marital status, educational level, current work situation, health insurance status, total annual income, number of years living with HF, significant medical co-morbidities (diabetes, hypertension, coronary heart disease, chronic pulmonary obstructive disease and arthritis), and

participants height/weight. Self-report information was collected by questionnaire at time of interview (Appendix E).

Data Analysis

Demographic and clinical characteristics of participants in this study were described using means and standard deviations. Bivariate and multivariate analyses were performed to test whether there was an association, or relationship, between the independent and dependent variables. A general correlation matrix was used to test for significance, followed by the use of specific linear models with and without covariate adjustment. In the correlation analysis, first order and partial correlations were performed to assist in the forward selection modeling effort. Significance was set at $p < 0.05$. All tests, unless otherwise noted, were performed using non-directional tests (two tailed hypothesis testing).

CHAPTER 4

RESULTS

Descriptive Statistics

The final sample of 26 individuals consisted mainly of Caucasians (n = 23, 88.5%) and males (n = 19, 73.1%). The age range of participants was 43-84 years of age, with a mean age of 63.58 years (SD = 10.37). The mean age for women was 64.00 years (SD = 12.77) and for men, it was 63.42 (SD = 9.74). Two reported their race as Latino/Hispanic (7.7%) and one reported as African American (3.8%). Sixty eight percent (n = 13) of men were married. Forty three percent (n = 3) of women were married. Roughly the same percentage of men and women were retired (n = 9, 47%; n = 3, 43% respectively), as was true for those men and women unable to work or disabled (n = 6, 32%; n = 3, 43% respectively). Ninety five percent (n = 18) of men and 57% (n = 4) of women had greater than or equal to a high school education. The mean number of years living with heart failure (HF) was 6 for women and 5 for men. Two women and two men were unaware of the number of years they had been living with HF.

Two participants (one male and one female) had recreational physical activity (dependent variable) levels greater than 4,000 kilocalories (kcal) per week. The mean level of recreational physical activity was 901.26 kcal per week while the mean for males was 725.97 kcal per week and for females it was 1,377.04 kcal per week. Although there seems to be a difference in the mean values for recreational physical activity by gender, there was lack of statistical evidence to suggest a gender effect ($p > 0.05$).

Table 1 presents physical activity means for the YALE Physical Activity Survey and motivation means for the psychological construct questionnaires. Of note, the Relative Autonomy Index (RAI) for motivation ranges from -18.00 (extrinsic motivation) to 18.00 (intrinsic motivation). The RAI range for participants in this study was -0.25 to 14.00; mean RAI score was 6.54 (*SD* = 4.72).

Table 1

Mean Values for Physical Activity and Motivation Variables (N = 26)

Variables	Mean	Standard Deviation
Work Physical Activity	3858.07[a]	2716.85
Yardwork Physical Activity	657.95[a]	640.61
Exercise Physical Activity	970.96[a]	1346.19
Recreational Physical Activity	901.26[a]	1300.32
Relative Autonomy Index	6.54[b]	4.72
i2_mot	4.85[b]	1.49
Perceived Autonomy Support	4.59[b]	1.58
Perceived Competence	4.64[b]	1.88
Self-efficacy	3.23[b]	0.97

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation)
[a]Number of kilocalories expended per week. [b]These values indicate absolute units, with lower numbers indicating a lower level of the psychological construct being measured. Internal motivation, perceived autonomy support, and perceived competence range from 1-7; self-efficacy from 1-5.

One hundred percent ($n = 7$) of women and 74% ($n = 14$) of men had greater than or equal to two of the five co-morbidities of interest (diabetes mellitus [DM], chronic obstructive pulmonary disease [COPD], hypertension [HTN], coronary artery disease [CAD], and arthritis). Participants averaged two co-morbidities per person. Mean levels of recreational physical activity did not differ significantly by number of co-morbidities.

Hypotheses Testing

Due to the fact that this was an exploratory pilot study with a small sample size (N = 26), both Pearson and Spearman correlation analyses were performed and reported. Results relevant to hypotheses one through four, six and seven can be found in Tables 2 and 3.

Hypothesis one stated that patients' perceived autonomy support for physical activity would be associated with internal motivation for physical activity. As can be seen in Tables 2 and 3, perceived autonomy support did not relate to patients' internal motivation for physical activity. However, Spearman correlation results (Spearman $r = 0.365$, $p = 0.067$) suggest a trend toward significance. Further investigation is warranted with a larger population to more thoroughly test this relationship.

Hypothesis two stated that internal motivation for physical activity would be associated with levels of recreational physical activity. As shown in Tables 2 and 3, a very weak association was found between internal motivation for physical activity and levels of recreational physical activity. This is subject to sample size, which makes it difficult to argue that there is or is not association. Further analysis is needed with a larger unbiased sample to either support or reject claim.

Hypothesis three stated that patients' perceived autonomy support for physical activity would be associated with perceived competence for physical activity. As can be seen in Tables 2 and 3, a very weak association was found between patients' perceived autonomy support and perceived competence for physical activity. Due to the small sample size it is difficult to argue that there is or is not an association. Further analysis is needed with a larger unbiased sample to either support or reject claim.

Hypothesis four stated that perceived competence would be associated with levels of recreational physical activity. Correlation analyses suggest a very weak association was found between perceived competence and levels of recreational physical activity (see Tables 2 and 3). As with hypotheses one through three, this is subject to sample size which makes it difficult to argue that there is or is not an association. Further analysis is needed with a larger unbiased sample to either support or reject claim.

Hypothesis six stated that self-efficacy for physical activity would be associated with perceived competence for physical activity. As shown in Tables 2 and 3, this hypothesis was supported (Pearson correlation $r = 0.713, p < 0.001$; Spearman correlation $r = 0.698, p < 0.001$). This strong positive association supports the valid (proven) association ($r = 0.6$ to 0.7) reported by W. Geoffrey (personal communication, September 18, 2006).

Hypothesis seven stated that internal motivation and perceived competence for physical activity would be associated. As can be seen in Tables 2 and 3, there is a moderate association (Pearson correlation $r = 0.573, p < 0.002$; Spearman correlation $r = 0.455, p < 0.02$) between perceived competence and internal motivation.

Table 2

Pearson Correlations between Covariates and the Dependent Variable

Variable	1	2	3	4	5
1. Perceived Autonomy Support	---				
2. i2_mot	0.33	---			
3. Recreational Physical Activity	---	0.198	---		
4. Perceived Competence	0.092	0.573**	0.104	---	
5. Self-Efficacy	---	---	---	0.713**	---

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation); ** $p < .01$ (2 – tailed).

Table 3

Spearman Correlations between Covariates and the Dependent Variable

Variable	1	2	3	4	5
1. Perceived Autonomy Support	---				
2. i2_mot	0.365	---			
3. Recreational Physical Activity	---	-0.005	---		
4. Perceived Competence	0.143	0.455*	0.074	---	
5. Self-Efficacy	---	---	---	0.698**	---

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation); * $p < .05$ (2 – tailed), ** $p < .01$ (2 – tailed).

Finally to test hypothesis five, which stated that the relationship between patients' perceived autonomy support for physical activity and recreational physical activity would be mediated by internal motivation and perceived competence, simple and multivariate linear regression analyses were performed. Based upon the results of these analyses the covariates in each of the models explained roughly 6.2 – 7.7% of the variation in recreational physical activity (see Table 4).

As can be seen in Table 4, while there is limited support to suggest a statistical association between the dependent variable recreational physical activity and covariates, internal motivation for physical activity seems to have some intervening effect on perceived autonomy support for physical activity. Likewise, perceived competence for physical activity seems to have some intervening effect on internal motivation for physical activity when entered into the model, which is evident in the correlation analyses performed. Perceived competence for physical activity had little to no intervening effect on perceived autonomy support for physical activity when included in the model.

In spite of the inconclusive statistical results, it cannot be claimed there is no association between the dependent variable and covariates. The statistical test fails to recognize there is an association. Further investigation is necessary, with increased sample size possibly including a control group, treatment/non-treatment group, multiple sites, a pre and post test, actual measures of exercise while checking for gender, ethnicity, age and other factors.

Table 4

Summary of Regression Analysis for Variables Mediating Patients' Perceived Autonomy Support for Physical Activity and Recreational Physical Activity

Variable	*B*	*SE B*	β	R^2
Step 1				
Perceived Autonomy Support	205.7	162.8	0.250	0.062
Step 2				
Perceived Autonomy Support	170.5	174.8	0.207	0.077
i2_mot	113.0	185.6	0.129	
Step 3				
Perceived Autonomy Support	199.4	166.5	0.242	0.069
Perceived Competence	56.8	140.1	0.082	
Step 4				
Perceived Autonomy Support	172.0	180.1	0.209	0.077
i2_mot	104.0	232.5	0.119	
Perceived Competence	11.7	174.7	0.017	

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation)

Due to the exploratory design utilized in this study additional analyses were conducted. The reasons for these additional analyses were: first, other forms of physical activity might have a positive association, and second, since perceived competence and self-efficacy were highly correlated, we wanted to see the additional impact of substituting self-efficacy for perceived competence.

Substituting self-efficacy for perceived competence in the model explained roughly 6.9 – 11.4% of the variation in recreational physical activity. As can be seen in Table 5, while there is limited support to suggest a statistical association between

recreational physical activity and its covariates, internal motivation for physical activity seems to have some intervening effect on perceived autonomy support for physical activity. Substituting self-efficacy for perceived competence seems to have some intervening effect on internal motivation for physical activity when entered into the model. Although non-significant, self-efficacy appears to have an intervening effect on perceived autonomy support for physical activity when included in the model.

Table 5

Summary of Regression Analysis for Variables Mediating Patients' Perceived Autonomy Support for Physical Activity and Recreational Physical Activity

Variable	*B*	*SE B*	β	R^2
Step 1				
Perceived Autonomy Support	205.7	162.8	0.250	0.062
Step 2				
Perceived Autonomy Support	170.5	174.8	0.207	0.077
i2_mot	113.0	185.6	0.129	
Step 3				
Perceived Autonomy Support	223.0	171.0	0.271	0.069
Self-Efficacy	-114.5	278.8	-0.085	
Step 4				
Perceived Autonomy Support	179.9	175.4	0.218	0.114
i2_mot	242.1	230.1	0.277	
Self-efficacy	-327.9	344.2	-0.244	

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation)

Substitution of work for recreational physical activity was not significant. However, as shown in Table 6, while there is limited support to suggest a statistical association between the dependent variable work and covariates, internal motivation for physical activity seems to have some intervening effect on perceived autonomy support for physical activity. Likewise, perceived competence for physical activity seems to have an intervening effect on internal motivation for physical activity when entered into the model. Perceived competence for physical activity had little to no intervening effect on perceived autonomy support for physical activity when included in the model.

Table 6

Summary of Regression Analysis for Variables Mediating Patients' Perceived Autonomy Support for Physical Activity and Work

Variable	*B*	*SE B*	β	R^2
Step 1				
Perceived Autonomy Support	45.1	1701.1	0.026	0.001
Step 2				
Perceived Autonomy Support	32.4	380.0	0.010	0.001
i2_mot	40.8	403.5	0.022	
Step 3				
Perceived Autonomy Support	38.9	360.0	0.023	0.002
Perceived Competence	55.9	303.1	0.039	
Step 4				
Perceived Autonomy Support	39.8	391.4	0.023	0.002
i2_mot	-3.2	505.1	-0.002	
Perceived Competence	57.3	379.6	0.040	

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation)

When substituting yardwork for recreational physical activity the model showed that perceived competence did have a significant intervening effect ($\beta = .408$, $p = .042$) on perceived autonomy support for physical activity, as well as a significant intervening effect ($\beta = .595$, $p = .016$) on perceived autonomy support and internal motivation for physical activity. Internal motivation for physical activity had little to no intervening effect on perceived autonomy support for physical activity when included in the model (see Table 7). Thus, the analyses indicate that perceived competence did mediate the

Table 7

Summary of Regression Analysis for Variables Mediating Patients' Perceived Autonomy Support for Physical Activity and Yardwork

Variable	*B*	*SE B*	β	R^2
Step 1				
Perceived Autonomy Support	48.6	82.2	0.120	0.014
Step 2				
Perceived Autonomy Support	45.8	89.0	0.113	0.015
i2_mot	8.8	94.5	0.020	
Step 3				
Perceived Autonomy Support	33.3	77.0	0.082	0.179
Perceived Competence	139.4	64.8	0.408*	
Step 4				
Perceived Autonomy Support	72.1	80.1	0.178	0.249
i2_mot	-147.5	103.3	-0.342	
Perceived Competence	203.4	77.7	0.595*	

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation); *$p < .05$ (2 – tailed).

relationship between perceived autonomy support for physical activity and yardwork.

Lastly, the substitution of exercise for recreational physical activity in the model concludes that internal motivation had a significant intervening effect ($\beta = .461$, $p = .026$) on perceived autonomy support for physical activity. Likewise, perceived competence had a significant intervening effect on perceived autonomy ($\beta = .549$, $p = .004$) and internal motivation and perceived autonomy support for physical activity ($\beta = .445$, $p = .045$) when included in the model (see Table 8). Thus, the analyses indicate that internal motivation and perceived competence for physical activity did mediate the relationship between perceived autonomy support and exercise.

In summary, the first five hypotheses were not supported, while hypotheses six and seven were supported. Of the additional analyses performed, only the substitutions of the dependent variable recreational physical activity with yardwork and exercise were supported.

Table 8

Summary of Regression Analysis for Variables Mediating Patients' Perceived Autonomy Support for Physical Activity and Exercise

Variable	*B*	*SE B*	β	R^2
Step 1				
Perceived Autonomy Support	180.0	170.2	0.211	0.045
Step 2				
Perceived Autonomy Support	50.2	164.9	0.059	0.234
i2_mot	417.4	175.1	0.461*	
Step 3				
Perceived Autonomy Support	136.7	144.7	0.160	0.343
Perceived Competence	394.1	121.8	0.549**	
Step 4				
Perceived Autonomy Support	91.5	154.8	0.107	0.365
i2_mot	171.8	199.7	0.190	
Perceived Competence	319.5	150.1	0.445*	

Note. i2_mot = Internal Motivation (Identified Regulation + Intrinsic Motivation); *$p < .05$ (2 – tailed), **$p < .01$ (2 – tailed)

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Discussion

Motivational interviewing (MI) has been shown to be an effective counseling style among a variety of populations (Markland, Ryan, Tobin, & Rollnick, 2005), in engaging individuals to both adopt and maintain regular physical activity; however, the literature is lacking in this area among HF patients. One underlying theoretical basis of MI that has been proposed is Self-determination Theory (SDT; Deci & Ryan, 1985, 2000). Exploration of the SDT constructs of autonomous motivation, perceived competence, and autonomy support (i.e. relationship with health care provider) may lead to better MI with HF patients. To explore the various SDT constructs, this current pilot study utilized a sample of convenience, or purposeful sample with a cross-sectional exploratory study design. Participants were selected from the Heart Failure Clinic of the UNTHSC Patient Care Center at Fort Worth.

The general purpose of this study was to explore the relationships between specific SDT constructs and physical activity. SDT proposes that the satisfaction of the needs for autonomy, competence, and relatedness is essential to sustained and healthy motivation, and that these needs are most likely to be fulfilled in environments supportive of people's autonomy. Applying SDT to various health-related domains, researchers have shown that patients who not only perceive, but also experience their health care providers as being "autonomy supportive" benefit the most from treatment (Sheldon, Williams, & Joiner, 2003; Williams 2002). In this study HF patients completed an

interviewer-administered questionnaire examining perceptions of their motivation, competence, self-efficacy, and their health care providers' autonomy support, as well as, assessing their level of physical activity during a typical week during the preceding month.

Overall, the findings of this study were limited by the small sample size, thus, on the theoretical side, it was difficult to demonstrate support for SDT's proposal that autonomy support serves to satisfy psychological needs that are necessary for sustained autonomous motivation. However, some of the current findings did demonstrate the importance of motivation-related variables to understanding how to motivate HF patients to both initiate physical activity and maintain greater levels of physical activity.

In this study, the association between perceived autonomy support and internal motivation for physical activity, although non-significant, suggests a trend indicating the more autonomy-supportive patients perceive their health care provider to be, the more internally motivated they are to engage in and maintain regular physical activity. In other words, when HF patients are given the opportunity to experience a sense of choicefulness and authorship with respect to their exercise behavior, their motivation to carry out the behavior becomes more internal. Because of this, it was hypothesized that internal motivation for physical activity would be associated with levels of recreational physical activity. Though a very weak association was found between internal motivation and levels of recreational physical activity, the small sample size makes it difficult to argue there is or is not association.

Perceived competence is based on an individual's experiences and beliefs that he or she can produce a desired outcome. When people receive little opportunity to explore and try to master the environment or when their sense of competence is not supported, a lack of motivation is likely to result (Deci & Ryan, 2000). In this study it was hypothesized that patients' perceived autonomy support for physical activity would be associated with perceived competence for physical activity and that perceived competence, in turn, would be associated with levels of recreational physical activity. A very weak association was found between perceived autonomy support and perceived competence. Likewise a very weak association was found between perceived competence and levels of recreational physical activity. This lack of statistical evidence to support or reject these claims was subject to sample size, thus reinforcing the need for further analyses with a larger unbiased sample.

Given the importance of internal motivation and perceived competence with regards to more positive treatment outcomes, it was hypothesized that the relationship between patients' perceived autonomy support for physical activity and recreational physical activity would be mediated by internal motivation and perceived competence. While there is limited support to suggest a statistical association between the dependent variable recreational physical activity and the SDT constructs of autonomy support, autonomous or internal motivation and perceived competence, some intervening or mediating effects were found among the SDT constructs themselves. Internal motivation for physical activity mediated perceived autonomy support, while perceived competence for physical activity mediated internal motivation. This trend toward significance

supports the need for further research with larger sample sizes. Power calculations revealed sample sizes ranging from 119 – 134 are required to detect statistical significance.

The first significant relationship found in this study was the association between self-efficacy for physical activity and perceived competence for physical activity. This strong positive association supports the valid association (r = 0.6 to 0.7) previously reported (but not published) by G. Williams (personal communication, September 18, 2006). In terms of MI, the principle of supporting people's feeling of self-efficacy is to enhance people's confidence in their capacity to organize and execute the courses of action required to make progress in the change process and in their ability to effectively cope with setbacks. From a SDT-perspective, supporting people's self-efficacy is likely to satisfy the need for competence, enhancing the counseling process. Thus when applying the key principles of MI during interventions with HF patients, the supporting of patients' self-efficacy is likely to satisfy their need for competence, which in turn aids in producing the desired outcome—regular physical activity.

The second significant relationship found in this study was the association between internal motivation and perceived competence for physical activity. This moderate association helps to understand the commonality between MI and SDT in terms of one of the key clinician goals in MI to 'roll with resistance'. To avoid resistance, the therapist should not challenge the client, or tell him what to do. Instead the therapist is to help people see for themselves what they are doing, and by doing so hopefully the client moves into a position to make a personally committed choice about what to do next.

When the client is in a position to make a choice with which they can identify and have bought into, their need for autonomy is more likely to be satisfied, thus aiding in the desired positive outcome—regular physical activity.

Of the additional multiple regression analyses conducted in this study, only the substitutions of the dependent variable recreational physical activity with yardwork and exercise were supported. When substituting yardwork for recreational physical activity perceived competence did mediate the relationship between perceived autonomy support for physical activity and yardwork. Thus, indicating that the more HF patients' sense of competence for physical activity was supported by their health care provider, the more kcal per week they expended doing yardwork.

Likewise, when substituting exercise for recreational physical activity, internal motivation and perceived competence did mediate the relationship between perceived autonomy support for physical activity and exercise. This result indicated that the more HF patients' sense of competence for physical activity was supported by their health care provider, the more internally motivated they were, thus the more kcal per week they expended doing exercise.

Conclusions and Implications for Public Health

The potential to have an impact on HF morbidity and mortality by understanding the relationships between the various SDT constructs and physical activity is certainly tremendous. However, this study had several limitations. First the sample size was small and included outliers. These outliers were not by definition true outliers, but instead were a population identified as having high exercise capacity despite their diagnosis of HF.

The large standards of deviation for recreational physical activity seen in this study were due to these outliers. Second, participation in this study was voluntary. Five eligible patients declined to participate. Loss of data from these participants may have biased the sample if they were in general more likely to engage in higher levels of recreational physical activity or to be more internally motivated. Likewise, the opposite may also be true, in that, these participants may have biased the sample if they were in general more likely to engage in lower levels of recreational physical activity or to be less internally motivated. Third, because a questionnaire was used to obtain data, the assumption was made that participants were responding honestly when answering questions asked of them during the interview procedure. Energy expenditure values (kilocalories expended) were also derived from the self-report information, which has been shown to have certain weaknesses when used as a physical activity outcome variable (Leenders, Sherman, & Nagaraja, 2000; Melanson, & Freedson, 1996). Nonetheless, there is evidence that the physical activity questionnaire used in this study correlates well with measured aerobic capacity, at least in older adults (DiPietro, Caspersen, Ostfeld, & Nadel, 1993). Fourth, stringent ejection fraction criteria of $\leq 40\%$ limited the sample size; however this could be overcome in future research by involving multiple clinics/sites to improve recruitment.

The chronic heart failure syndrome is important regardless of underlying diagnosis or etiology, for the result is a cascade of symptoms leading to decreased quality of life and ultimately death. Despite the progress made in the past century in understanding the molecular and cellular processes that contribute to HF, and the resulting development of effective therapies, HF remains a major cause of morbidity and

mortality. Pharmacological approaches, new treatments targeting disease mechanisms at the cellular and whole-organ level are not enough, for improved ejection fraction without physical conditioning does not equal improved quality of life. Non-pharmacological approaches such as MI with HF patients are needed to increase the level and types of physical activity in patients with HF. Any activity which prevents clinical deterioration and reduces hospitalization has tremendous public health implications and deserves additional study and resources.

Further research is needed of the relationships between the various SDT constructs and physical activity in larger samples. Further research should also include a control group, treatment/non-treatment group, multiple sites, a pre and post test, actual measures of exercise while checking for gender, ethnicity, age and other factors.

Additionally, further research may benefit from the inclusion of patient's ejection fraction (EF) as part of the data collected. This information would allow for the categorization of participants by EF and the ability to determine any observed differences in responses as related to EF.

Lastly, further research should take into consideration the benefits of utilizing a qualitative design. Though this current study utilized an interviewer-administered questionnaire, participants freely shared their stories with the interviewers. It was in these stories that plausible insights as to how they experienced life were revealed. Exercising or being physically active on a regular basis as a HF patient was put into context via their stories. Almost all of the participants valued exercise or being physically active, with many interested in and wanting to participate in exercise programs like those found

within cardiac rehabilitation programs. It is this information that, although not of statistical significance in this current study due to study design, is of clinical significance which may prove to be even more powerful and meaningful when utilized to design interventions and further research. In particular, qualitative information gleaned from HF patients participating in focus groups could be utilized to develop questionnaires for the assessment of physical activity among this population. For to date, no physical activity questionnaire exists within the literature that is targeted specifically at HF patients.

The findings of this study lend some support to better understanding the relationships between specific SDT constructs and physical activity. Simply administering the appropriate pharmacological or invasive treatment, providing information, answering questions, and creating an autonomy-supportive environment in which HF patients feel comfortable enough to discuss their concerns is not enough. It is the patient who must decide if they want to adopt or maintain a regular physical activity regimen. This is a critical point to understand when utilizing MI to assist patients with sustained behavior change. Because MI is a counseling style that can be performed by many types of health care providers in a variety of settings; these findings have the potential to have a tremendous public health impact on HF in the twenty-first century.

REFERENCES

Alexander, R. W., Schlant, R. C., Fuster, V., O'Rourke, R. A., Roberts, R., & Sonnenblick, E. H., (1999). *Hurst's The Heart, Ninth Edition, Companion Handbook.* New York. McGraw-Hill.

American Heart Association (2006). Heart Disease and Stroke Facts, Dallas,Texas.

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

Bandura, A., (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37,* 122-147.

Bandura, A., (1997). *Self-efficacy: The exercise of control.* New York: W. H. Freeman and Company.

Biddle, S., (1999). Motivation and perceptions of control: tracing its development and plotting its future in exercise and sport psychology. *Journal of Sport and Exercise Psychology, 21, 1.*

Britt, E., Blampied, N., & Hudson, S., (2003). Motivational interviewing: A review. *Australia Psychology, 38(3),* 193-201.

Brodie, D. A. & Inoue, A., (2005). Motivational Interviewing to promote physical activity for people with CHF. *Journal of Advanced Nursing, 50(5),* 518-527.

Burke, B. L., Arkowitz, H., & Menchola, M., (2003). The efficacy of motivational interviewing: A meta-analysis of controlled clinical trials. *Journal of Consulting and Clinical Psychology, 71(5),* 843-861.

Centers for Disease Control and Prevention, (2004). The Burden of Heart Disease and Stroke in the United States: State and National Data, 1999. Atlanta: Centers for Disease Control and Prevention.

Clark, R. A., McLennan, S., Dawson, A., Wilkinson, D., & Stewart, S., (2004). Uncovering a hidden epidemic: a study of the current burden of heart of heart failure in Australia. *Heart Lung Circulation, 13,* 266-273.

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R., (1994). Facilitating internalization: the self-determination theory perspective. *Journal of Personality, 62,* 119-142.

Deci, E. L. & Ryan, R., (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Deci, E. L., & Ryan, R. M., (2000). The "what" and the "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11,* 227-268.

Di Loreto, C., Fanelli, C., Lucidi, P., Murdolo, G., De Cicco, A., & Parlanti, N., (2003). Validation of a counseling strategy to promote the adoption and the maintenance of physical activity by type 2 diabetic subjects. *Diabetes Care, 26,* 404-408.

DiPietro, L., Caspersen, C. J., Ostfeld, A. M., & Nadel, E. R., (1993). A survey for assessing physical activity among older adults. *Medicine Science Sports and Exercise, 25:*628-642.

Dickstein, K. & Jaarsma, T., (2005). Heart failure management programs: delivering the message. *European Journal of Heart Failure, 7,* 291-293.

Draycott, S. & Dabbs, A., (1998). Cognitive dissonance 2: a theoretical grounding of motivational interviewing. *British Journal of Consulting and Clinical Psychology, 37,* 355-364.

Dunn, C., DeRoo, L., & Rivara, F. P., (2001). The use of brief interventions adapted from motivational interviewing across behavioral domains: a systematic review. *Addiction, 96,* 1725-1742.

Elixhauser, A., Yu, K., Steiner, C., Bierman, A.S., (2000). Most common reasons for hospitalizations by age groups, in hospitalization in the United States, 1997, Rockville (MD): Agency for Healthcare Research and Quality, 2000 HCUP Fact Book; AHRQ Publication No. 00-0031.

ExTraMATCH Collaborative, (2004). Exercise training meta-analysis of trails in patients with chronic heart failure (ExTraMATCH). *British Medical Journal, 328,* 189-195.

Gagne, M., Ryan, R., M., & Bargmann, K., (2003). The effects of parent and coach autonomy support on need satisfaction and well being of gymnasts. *Journal of Applied Sport Psychology, 15,* 372-390.

Gortner, S. R. & Jenkins, L. S., (1990). Self-efficacy and activity level following cardiac surgery. *Journal of Advanced Nursing, 15,* 1132-1138.

Harland, J., White, M., Drinkwater, C., Chinn, D., Farr, L., & Howel, D., (1999). The Newcastle exercise project: A randomized controlled trial of methods to promote physical activity in primary care. *British Medical Journal, 319,* 828-831.

Haskell, W. L., Lee, I., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., et al. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Medicine & Science in Sports & Exercise, 39(8),* 1423-1434.

Heart Failure Society of America http://www.abouthf.org/default.htm accessed September 4, 2006 and December 31, 2007.

Kirk, A., Mutrie, N., MacIntyre, P., & Fisher, M., (2003). Increasing physical activity in people with type 2 diabetes. *Diabetes Care, 26,* 1186-1192.

Leenders, N. Y. J. M., Sherman, W. M., & Nagaraja, H. N., (2000). Comparisons of four methods of estimating physical activity in adult women. *Medicine & Science in Sports & Exercise, 32(7),* 1320-1326.

McAuley, E., Lox, C., & Duncan, T. E., (1993). Long-term maintenance of exercise, self-efficacy, and psychological change in older adults. *Journal of Gerontology, 48*(4), 218-224.

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.

Markland, D., Ryan, R. M., Tobin, V. J. & Rollnick, S., (2005). Motivational interviewing and self-determination theory. *Journal of Social and Clinical Psychology, 24(6),* 811-831.

Martinson, B., Crain, A., Pronk, N., O'Connor, P., & Maciosek, M., (2003). Changes in physical activity and short-term changes in health care charges: a prospective cohort study of older adults. *Preventive Medicine, 37,* 319-326.

Melanson, E. L. Jr., & Freedson, P. S., (1996). Physical activity assessment: a review of methods. *Critical Review Food Science Nutrition, 36(5),* 385-396.

Miller, W. R., (1983). Motivational interviewing with problem drinkers. *Behavioural Psychotherapy, 11,* 147-172.

Miller, W. R., & Rollnick, S., (2002). *Motivational interviewing, second edition: preparing people for change.* New York: The Guilford Press.

Mondoa, C. T., (2004). The implications of physical activity in patients with chronic heart failure. *Nursing in Critical Care, 9(1),* 13-20.

Motivational Interviewing: Resources for Clinicians, Researchers, and Trainers Web site. Accessed April 07, 2006. URL: http://www.motivationalinterview.org

National Heart Lung and Blood Institute, Congestive Heart Failure Data Fact Sheet http://www.wrongdiagnosis.com/artic/nhlbi_congestive_heart_failure_data_fact_sheet accessed December 31, 2007.

National Heart Lung and Blood Institute, Diseases and Conditions Index, Heart Failure http://www.nhlbi.nih.gov/health/dci/Diseases/Hf accessed September 4, 2006 and December 31, 2007.

Nelson, M. E., Rejeski, W. J., Blair, S. N., Duncan, P. W., Judge, J. O., King, A. C., et al. (2007). Physical activity and public health in older adults: Recommendation

from the American College of Sports Medicine and the American Heart Association. *Medicine & Science in Sports & Exercise, 39(8),* 1435-1445.

Oka, R. K., Gortner, S. R., Stotts, N. A., & Haskell, W. L., (1996). Predictors of physical activity in patients with chronic heart failure secondary to either ischemic or idiopathic dilated cardiomyopathy. *American Journal of Cardiology, 77,* 159-163.

Pinto, B. M., Goldstein, M. G. & Marcus, B. H., (1998). Activity counseling by primary care physicians. *Preventive Medicine, 27,* 506-513.

Roberts, G. C., (1992). Motivation in sport and exercise: conceptual constraints and convergence. In G. C. Roberts (Ed.), *Motivation in sport and exercise.* Champaign: Human Kinetics.

Rogers, C. R., (1961). *On becoming a person.* Boston: Houghton Mifflin Company.

Rose, E. A., Markland, D., & Parfitt, G., (2001). The development and initial validation of the exercise causality orientation scale. *Journal of Sports and Sciences, 19,* 445-462.

Ryan, R., M., & Connell, J. P., (1989). Perceived locus of causality and internalization: examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57,* 749-761.

Sheldon, K. M., Williams, G., & Joiner, T., (2003). *Motivating health: Applying self-determination theory in the clinic.* Yale: Yale University Press.

Sole, M. L., Lamborn, M. L., & Hartshorn, J. C., (2001). *Introduction to critical care nursing.* Philadelphia: W. B. Saunders Company.

Stewart, S., MacIntyre, K., Capewell, S., & McMurray, J. J., (2003). Heart failure and the aging population: an increasing burden in the 21st century? *Heart, 89,* 49-53.

Strath, S. J., Bassett, D. R. Jr., Ham, S. A., & Swartz, A. M., (2003). Assessment of physical activity by telephone interviews versus objective monitoring. *The American College of Sports Medicine, 35(5),* S1, S114.

Thomas, C. L. (Ed.). (1997). *Taber's cyclopedic medical dictionary* (18th ed.). Philadelphia: F.A. Davis Company.

US Department of Health and Human Services, (1996). Physical activity and health: report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for Chronic Disease Prevention and Health Promotion.

US Department of Health and Human Services, (2002). Physical activity fundamental to preventing disease. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for Chronic Disease Prevention and Health Promotion.

Vallerand, R. J., Fortier, M., S., & Guay, F., (1997). Self-determination and persistence in a real-life setting: toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72,* 1161-1176.

Werner, R., & Benjamin, B. E., (1998). *A massage therapist's guide to pathology.* Baltimore: Williams & Wilkens.

Westerterp, K. P., (1999). Assessment of physical activity level in relation to obesity: current evidence and research issues. *Medicine and Science in Sports and Exercise, 31(11),* S1, S522.

Williams, G. C., (2002). Improving patients' health through supporting the autonomy of patients and providers. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research.* Rochester: University of Rochester Press.

Williams, G. C., & Deci, E. L., (1996). The National Cancer Institute guidelines for smoking cessation: do they motivate quitting? *Journal of General Internal Medicine, 11*(Suppl. 1), 138.

Williams, G. C., Freedman, Z. R., & Deci, E. L., (1998). Supporting autonomy to motivate patients with diabetes for glucose control. *Diabetes Care, 21,* 1644-1651.

Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L., (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70,* 115-126.

Williams, G. C., Weiner, M. W., Markakis, K. M., Reeve, J., & Deci, E. L., (1994). Medical students' motivation for internal medicine. *Journal of General Internal Medicine, 9,* 327-333.

APPENDIX A

MOTIVATION AS A CONTINUUM

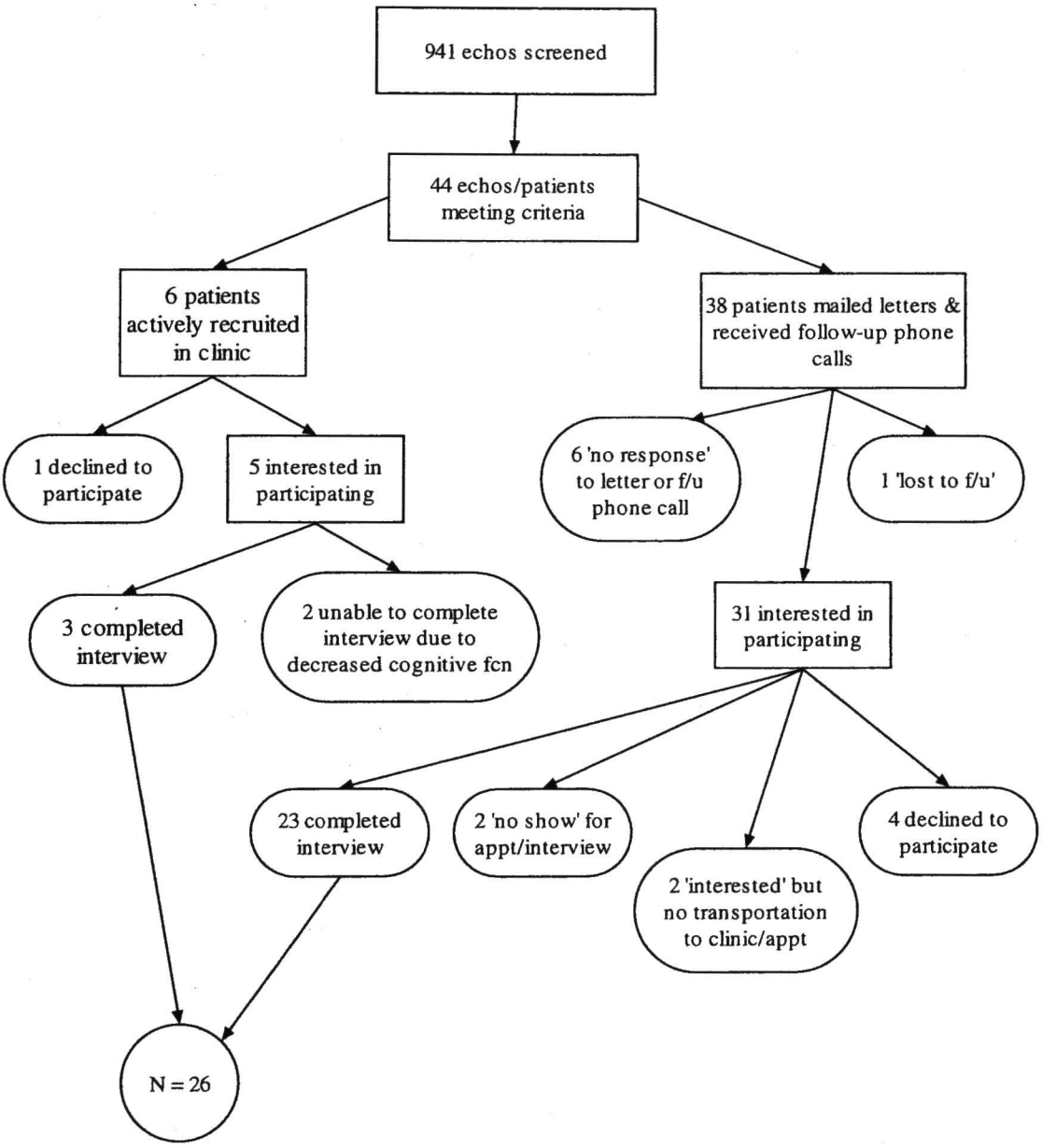
Appendix A
Motivation as a Continuum

(Amotivation)	*Extrinsic Motivation*				*(Intrinsic Motivation)*
Amotivation	External regulation "If I must"	Introjected regulation "ought"	Identified regulation "want to"	Integrated regulation "who I am"	Intrinsic motivation "enjoyment"
Least Self-Determined ←----------					----------→ Most Self-Determined

APPENDIX B

RECRUITMENT ALGORITHM

Appendix B
Recruitment Algorithm



APPENDIX C

INFORMED CONSENT AUTHORIZATION TO PARTICIPATE IN A RESEARCH PROJECT

INFORMED CONSENT AUTHORIZATION TO PARTICIPATE IN A RESEARCH PROJECT

TITLE: Examining the theoretical constructs of Motivational Interviewing: Applying Self-Determination Theory to physical activity among Heart Failure patients

PRINCIPAL INVESTIGATOR: Shawn Jeffries, PhD
CO-INVESTIGATORS: Nancy Tierney, PhD, RN, CS, ACNP
Frederick Schaller, MD
STUDENT INVESTIGATOR: Cathy B Spranger, MPH

INSTITUTION: University of North Texas Health Science Center at Fort Worth

SUBJECT NAME (please print):_____

I. STUDY PURPOSE

The purpose of this research study is to explore attitudes, beliefs, and behavior regarding physical activity among heart failure patients.

II. STUDY PROCEDURES

You will be asked to complete a questionnaire about your physical activity. The survey should take approximately 45 – 60 minutes. You do not need to answer any question that you are uncomfortable with.

III. RISKS AND DISCOMFORTS OF THE STUDY

The only possible risk to you (by participating in this study) would be a breech of confidentiality in which your responses to this survey would accidentally be revealed to someone other than the study investigators. However, the study investigators will take all precautions necessary to protect your confidentiality as a research study participant. No personal identifying information, such as name or address, will be collected on this survey.

IV. CONTACTS

If a study-related problem should occur, or if you have any question at any time about the study, you may contact either Dr. Nancy Tierney's office at (817)735-0491 or Dr. Shawn Jeffries' office at (817)735-0549. If you have any questions about your rights as a participant in this study, you may contact Dr. Brian Gladue, Chairman of the Institutional Review Board, University of North Texas Health Science Center at Fort Worth at (817) 735-0409.

V. BENEFITS

You may receive no direct benefit from participating in this study. The information gained from this research may lead to the development of better health education programs in the University of North Texas Health Science Center Heart Failure Clinic.

VI. CONFIDENTIALITY

Your survey answers will be kept as confidential as possible under current local, state, and federal laws. However, the Office for Human Protections, possibly other federal regulatory agencies, and the Institutional Review Board may examine your survey responses and the study

data. Incase the final results of this study should be published; your name will not appear in any published material.

VII. PARTICIPANT COSTS/COMPENSATION

There is no cost to you to participate in this study. The survey is completely voluntary. Upon completion of the questionnaire, you will be compensated $15.00, in the form of a gift card, for your time and transportation.

VIII. COMPENSATION FOR INJURY

We at the University of North Texas Health Science Center at Fort Worth have not set aside any funds for financial compensation should you be harmed as a result of your participation in this research.

You should know that by signing this form you are neither waiving any of your legal rights against nor releasing the principal investigator, the University of North Texas Health Science Center at Fort Worth or any of their respective agents from liability for negligence with respect to the conduct of this study. If you are harmed and you feel that this harm justifies pursuing a legal remedy, you have the right to do so.

IX. LEAVING THE STUDY

You can choose not to be in the study or leave it at any time without penalty or loss of benefits that you are otherwise entitled. Your participation (or non-participation), or any answer that you give, will in no way effect the care that you receive at the University of North Texas Health Science Center Heart Failure Clinic.

X. CONSENT

I understand that if I am a student or employee of the University of North Texas Health Science Center, my participation (or non-participation) will in no way affect my academic standing or employment status.

I voluntarily agree to participate in this study. I have had the chance to ask the study investigators any questions I have regarding this study.

I WILL RECEIVE A COPY OF THIS SIGNED INFORMED CONSENT AGREEMENT.

_____

Signature of Study Participant Date

_____

Signature of Person Obtaining Consent Date

APPENDIX D

CUE CARDS

Card #1

- **WORK**
  - Shopping (e.g. grocery, clothes)
  - Stair climbing while carrying a load
  - Laundry
  - Light Housework: tidying, dusting, sweeping, collecting garbage in home, polishing, indoor gardening, ironing
  - Heavy Housework: vacuuming, mopping, scrubbing floors and walls, moving furniture, moving boxes or garbage cans
  - Food Prep (10+ min.): chopping, stirring, moving around to get food items, pots and pans
  - Food Service (10+ min.): setting table, carrying food, serving food
  - Dishwashing (10+ min.): clearing table, washing and drying dishes, putting dishes away
  - Light Home Repair: small appliance repair, light household maintenance and repair tasks
  - Heavy Home Repair: painting, washing and polishing car, carpentry
  - Other: _____
- **YARDWORK**
  - Gardening: pruning, planting, weeding, hoeing, digging
  - Lawn Mowing (walking only)
  - Clearing walks and driveway: raking, shoveling, sweeping
  - Other: _____

Card #1 (cont.)

- **CARETAKING**
  - Older or disabled person: lifting, pushing wheelchair
  - Childcare: lifting, pushing stroller
- **EXERCISE**
  - Brisk walking for exercise (10+min): causes large increase in heart rate, breathing or leg fatigue
  - Stretching exercises, yoga, pool exercise
  - Vigorous calisthenics, aerobics: causes large increase in heart rate, breathing or leg fatigue
  - Cycling, exercycle
  - Lap swimming
  - Other: _____
- **Recreational Activities**
  - Leisurely walking (10+ min.)
  - Hiking
  - Needlework: knitting, sewing, crocheting, needlepoint
  - Dancing (mod/fast): line dancing, ballroom, square, tap, etc.
  - Bowling, bocci
  - Golf (walking to each hole only)
  - Racquet sports: tennis, racquet ball
  - Billiards
  - Other: _____

Card #2

- **Not at all**
- **1 – 3 times per month**
- **1 – 2 times per week**
- **3 – 4 times per week**
- **5 or more times per week**
- **Don't Know**

Card #3

- **10 – 30 minutes**
- **31 – 60 minutes per day**
- **60 or more minutes**
- **Don't know**

Card #4

- **Not at all**
- **Less than 1 hour per day**
- **1 to less than 3 hours per day**
- **3 to less than 5 hours per day**
- **5 to less than 7 hours per day**
- **7 or more hours per day**
- **Don't know**

Card #5

- **Not at all**
- **Less than 3 hours/day**
- **3 to less than 6 hours/day**
- **6 to less than 8 hours/day**
- **8 or more hours/day**

Cue Cards for Questionnaires #2 – 5

1	2	3	4	5	6	7
Not at all true			Somewhat true		Very true	

1 - Not at all confident
2 – Somewhat confident
3 – Moderately confident
4 – Very confident
5 – Completely confident

Sociodemographic and Clinical Information Cue Cards

Ethnicity

- African American
- Caucasian
- Latino/Hispanic
- Asian
- Pacific Islander
- Native American/Alaskan Native
- Other, please specify

Marital Status

- Single
- Married
- Divorced
- Widowed
- Separated
- Living with a significant other or partner

Educational Level

- Never attended school
- Less than high school
- High school graduate or GED
- Some college or tech school
- College graduate
- Post college graduate

Current Work Situation

- **Employed**
  - Full-time or Part-time
- **Retired**
- **Unable to work or disabled**

Health Insurance

- **No**
- **Yes, through employer**
- **Yes, Medicare**
- **Yes, Medicaid**
- **Yes, Military insurance**
- **Other, please specify**

Total Annual Income

- **$20,000 or less**
- **$20,001 - $40,000**
- **$40,001 - $60,000**
- **$60,001 – more**
- **Declined (wish not to answer)**

Co-morbidities

- **Diabetes**
- **Chronic Obstructive Pulmonary Disease (COPD)**
- **High Blood Pressure (Hypertension)**
- **Coronary Artery Disease**
- **Arthritis**

APPENDIX E

SURVEY INSTRUMENT

Appendix E

Participant ID ☐ ☐ ☐

Survey Instrument

#1 YALE Physical Activity Survey

INTERVIEWER: **(Please hand the subject the list of activities while reading this statement). Here is a list of common types of physical activities. Please tell me which of them you did during a typical week in the last month. Our interest is learning about the types of physical activities that are a part of your regular work and leisure routines.**

For each activity you do, please tell me how much time (hours) you spent doing this activity during a typical week. (Hand subject card #1.)

Work	**Time** (hrs/wk)	**Intensity Code*** (kcal/min)
Shopping (e.g., grocery, clothes)	_____	3.5
Stair climbing while carrying a load	_____	8.5
Laundry (time loading, unloading, hanging, folding only)	_____	3.0
Light Housework: tidying, dusting, sweeping; collecting trash in home; polishing; indoor gardening; ironing	_____	3.0
Heavy Housework: vacuuming, mopping; scrubbing floors and walls; moving furniture, boxes or garbage cans	_____	4.5
Food Preparation (10+ mins in duration): chopping stirring; moving about to get food items, pans	_____	2.5
Food Service (10+ mins in duration): setting table carrying food; serving food	_____	2.5
Dish Washing (10+ mins in duration): clearing table; Washing/drying dishes, putting dishes away	_____	2.5
Light Home Repair: small appliance repair; Light home maintenance/repair	_____	3.0
Heavy Home Repair: painting, carpentry Washing/polishing car	_____	5.5
Other: _____	_____	___

Yardwork:		
Gardening: planting, weeding, digging, hoeing	_____	4.5
Lawn Mowing (walking only)	_____	4.5
Clearing walks/driveway: sweeping, shoveling, raking	_____	5.0
Other: _____	_____	___

	Time (hrs/wk)	Intensity Code* (kcal/min)
Caretaking:		
Older or disabled person (lifting, pushing wheelchair)	_____	5.5
Childcare (lifting, carrying, pushing stroller)	_____	4.0
Exercise:		
Brisk walking (10+ mins in duration)	_____	6.0
Pool exercise, stretching, yoga	_____	3.0
Vigorous calisthenics, aerobics	_____	6.0
Cycling, exercycle	_____	6.0
Swimming (laps only)	_____	6.0
Other: _____	_____	___
Recreational Activities:		
Leisurely walking (10+ mins in duration)	_____	3.5
Needlework: knitting, sewing, needlepoint, etc.	_____	1.5
Dancing (mod/fast): line, ballroom, tap, square, etc.	_____	5.5
Bowling, bocci	_____	3.0
Golf (walking to each hole only)	_____	5.0
Racquet sports: tennis, racket ball	_____	7.0
Billiards	_____	2.5
Other: _____	_____	___

INTERVIEWER: (Please read to subject). I would now like to ask you about certain types of activities that you have done during the past month. I will ask you about how much activity, leisurely walking, sitting, standing, and some other things that you usually do.

1. About how many times during the month did you participate in vigorous activities that lasted at least 10 minutes and caused large increases in breathing, heart rate, or leg fatigue or caused you to perspire? (Hand subject card #2.)

Score:
0 = Not at all (go to Q3)
1 = 1 – 3 times per month
2 = 1 – 2 times per week
3 = 3 – 4 times per week
4 = 5+ times per week
7 = Refused
8 = Don't know

FREQUENCY SCORE = _____

2. About how long did you do this vigorous activity(ies) each time? (Hand subject card #3.)

Score:
0 = Not applicable
1 = 10 – 30 minutes
2 = 31 – 60 minutes
3 = 60+ minutes
7 = Refused
8 = Don't know

DURATION SCORE = _____

WEIGHT = 5

VIGOROUS ACTIVITY INDEX SCORE:

FREQ SCORE _____ X DUR SCORE _____ X WEIGHT_____ = _____
(Responses of 7 or 8 are scored as missing.)

3. Think about the walks you have taken during the last month. About how many times per month did you walk for at least 10 minutes or more without stopping which was not strenuous enough to cause large increases in breathing, heart rate, or leg fatigue or cause you to perspire? (Hand subject card #2)

Score:
0 = Not at all (go to Q5)
1 = 1 – 3 times per month
2 = 1 – 2 times per week
3 = 3 – 4 times per week
4 = 5+ times per week
7 = Refused
8 = Don't know

FREQUENCY SCORE = _____

4. When you did this walking, for how many minutes did you do it? (Hand subject card #3.)

Score

0 = Not applicable
1 = 10 – 30 minutes
2 = 31 – 60 minutes
3 = 60+ minutes
7 = Refused
8 = Don't know

DURATION SCORE = _____

WEIGHT = 4

LEISURELY WALKING INDEX SCORE:

FREQ SCORE _____ X DUR SCORE _____ X WEIGHT _____ = _____
(Responses of 7 or 8 are scored as missing.)

5. About how many hours a day do you spend moving around on your feet while doing things? Please report only time that you are actually moving. (Hand subject card #4.)

Score:

0 = Not at all
1 = Less than 1 hour per day
2 = 1 to less than 3 hours per day
3 = 3 to less than 5 hours per day
4 = 5 to less than 7 hours per day
5 = 7+ hours per day
7 = Refused
8 = Don't know

MOVING SCORE = _____

WEIGHT = 3

MOVING INDEX SCORE;

MOVING SCORE _____ X WEIGHT _____ = _____
(Responses of 7 or 8 scored as missing.)

6. Think about how much time you spend standing or moving around on your feet on an average day during the past month. About how many hours per day do you stand? (Hand subject card #4.)

Score:

0 = Not at all
1 = Less than 1 hour per day
2 = 1 to less than 3 hours per day
3 = 3 to less than 5 hours per day
4 = 5 to less than 7 hours per day
5 = 7+ hours per day
7 = Refused
8 = Don't know

STANDING SCORE = _____

WEIGHT = 2

STANDING INDEX SCORE:

STANDING SCORE _____ X WEIGHT _____ = _____
(Responses of 7 or 8 are scored as missing.)

7. About how many hours did you spend sitting on an average day during the past month?
(Hand subject card #5)

Score:
0 = Not at all
1 = Less than 3 hours
2 = 3 to less than 6 hours
3 = 6 to less than 8 hours
4 = 8+ hours per day
7 = Refused
8 = Don't know

SITTING SCORE = _____

WEIGHT = 1

SITTING INDEX SCORE:

SITTING SCORE _____ X WEIGHT _____ = _____
(Responses of 7 or 8 are scored as missing.)

8. About how many flights of stairs do you climb up each day?

_____
(Let 10 steps = 1 flight)

#2 Health Care Climate Questionnaire (Perceived Autonomy Support)

(Interviewer)
This questionnaire contains items that are related to your visits with your health-care providers (doctors, nurse practitioners, nurses) in which your exercising was discussed in any way. Health-care providers have different styles in dealing with patients, and we would like to know very specifically about your experience with your provider(s) in any visits when your exercising was discussed. Your responses will be kept confidential, so none of your providers will know your responses. Please be honest and open with your responses. In some cases, you may have met with several people. If you met with your physician, please respond with respect to him or her; if you met with several providers concerning this issue, please answer in terms of your experience of all these providers together.

Interviewer: (Please hand the subject the response scale while reading this statement). In answering the questions, please use the following scale:

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

1. I feel that my health care providers have provided me with choices and options about exercising regularly (including not exercising regularly).

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

2. I feel my health-care providers understand how I see things with respect to my exercising regularly.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

3. My health-care providers convey confidence in my ability to make changes regarding my exercising regularly.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

4. My health-care providers listen to how I would like to do things regarding my exercise.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

5. My health-care providers encourage me to ask questions about my exercising.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

6. My health-care providers try to understand how I see my exercising before suggesting any changes.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

#3 Motivation for Exercise

(Interviewer)
As I read aloud the following statements, please indicate the extent to which each statement is true for you. Please use the following scale (*Hand participant cue card):*

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

I try to exercise on a regular basis:

1. Because I would feel bad about myself if I did not.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

2. Because others would be angry with me if I did not.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

3. Because I enjoy exercising.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

4. Because I would feel like a failure of I did not.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

5. Because I feel like it's the best way to help myself.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

6. Because people would think I'm a weak person if I did not.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

7. Because I feel like I have no choice about exercising; others make me do it.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

8. Because it is a challenge to accomplish my goal.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

9. Because I believe exercise helps me feel better.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

10. Because it's fun.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

11. Because I worry that I would get in trouble with others if I did not.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

12. Because it feels important to me personally to accomplish this goal.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

13. Because I feel guilty if I do not exercise regularly.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

14. Because I want others to acknowledge that I am doing what I have been told I should do.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

15. Because it is interesting to see my own improvement.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

16. Because feeling healthier is an important value for me.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

#4 Self-Efficacy

(Interviewer)
A number of situations are described below that can make it hard to stick to exercise regularly (3 or more times a week). The following questions look at how confident you are to exercise when other things get in the way. I will read the following items, after each statement please state the number that best expresses how each item relates to you in your leisure time. Please answer using the following 5-point scales (*Hand participant cue card*):

1 – Not at all confident
2 – Somewhat confident
3 – Moderately confident
4 – Very confident
5- Completely confident

(Interviewer)
"How confident are you that you could overcome the following barriers?"

I am confident I can participate in regular exercise ...

_____1. ...even when I am feeling tired.

_____2. ...even when I am feel tense or under stress.

_____3. ...even during bad weather (ie., hot or cold outside, raining).

_____4. ...even after recovering from an injury that caused me to stop exercising.

_____5. ...even when I have worries and/or problems.

_____6. ...even if I feel depressed.

_____7. ...even when I am feeling anxious.

_____8. ...even after recovering from an illness that caused me to stop exercising.

_____9. ...even when I feel physical discomfort when I exercise.

_____10. ...even when I am alone.

_____11. ...even when I am busy.

_____12. ...even when visitors (friends or family) are present.

_____13. ...even when there are other interesting things to do.

_____14. ....even if I don't feel like it.

_____15. ...even when I am spending time with friends or family who do not exercise.

_____16. ...even during a vacation or when I am traveling.

_____17. ...even when I feel I don't have the time.

_____18. ...even without support from my family or friends.

#5 Perceived Competence (Exercising Regularly)

(Interviewer)
As I read aloud the following statements, please indicate the extent to which each statement is true for you, assuming that you were intending either to begin now a permanent regimen of exercising regularly or to permanently maintain your regular exercising regimen. Please use the following scale (*Hand participant cue card):*

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

1. I feel confident in my ability to exercise regularly.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

2. I now feel capable of exercising regularly.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

3. I am able to exercise regularly over the long term.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

4. I am able to meet the challenge of exercising regularly.

1 2 3 4 5 6 7
Not at all True Somewhat true Very true

#6 Sociodemographic and Clinical Information

1. Age ☐☐

2. Gender – Male ☐ Female ☐

3. Ethnicity – African American ☐ Caucasian ☐ Latino/Hispanic ☐
   Asian ☐ Pacific Islander ☐ Native American/Alaskan Native ☐
   Other ☐; Please specify:_____

4. Marital Status – Single ☐ Married ☐ Divorced ☐ Widowed ☐
   Separated ☐ Living with a significant other or partner ☐

5. Educational Level – Never attended school ☐ Less than high school ☐
   High school graduate or GED ☐ Some college or tech school ☐
   College graduate ☐ Post college graduate ☐ Refused ☐

6. Current Work Situation – Employed ☐ - Full – time ☐ Part-time ☐
   Retired ☐ Unable to work or disabled ☐ Refused ☐

7. Health Insurance – No ☐ Yes, through employer ☐ Yes, Medicare ☐
   Yes, Medicaid ☐ Yes, Military insurance ☐
   Other ☐; Please specify:_____
   Refused ☐

8. Total Annual Income - $20,000 or less ☐ $20,001 - $40,000 ☐
   $40,001 - $60,000 ☐ $60,001 – more ☐ Refused ☐
   Don't Know ☐

9. Number of years living with Heart Failure ☐☐ Don't Know ☐

10. Co-morbidities (check those that apply) – Diabetes ☐ COPD ☐ HTN ☐
    CAD ☐ Arthritis ☐ Don't Know ☐

11. Height – Feet ☐ Inches ☐ Weight (lbs) ☐☐☐