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Heart to Heart: A Cardiac Rehabilitation Follow-up Program

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Running Head: HEART TO HEART

Heart to Heart: A Cardiac Rehabilitation Follow-up Program

by

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DISSERTATION

Submitted in partial fulfillment of the requirements for the degree
of Doctor of Psychology in the Department of Clinical Psychology
of Antioch University New England, 2012

Keene, New Hampshire



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presented on June 29, 2012

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Dedication

This dissertation is lovingly dedicated to my grandfather, Max Vaughn Hammitt who, hours before his heart failed, dreamt me up to query “if not now, when?”

And to my grandchildren Sophia and Carter whose pure love and aliveness has awakened me to the extraordinarily loving nature of my Grandfather’s final quest.

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Abstract

This dissertation describes a tele-health follow-up program designed to attend to the problem of noncompliance in the process of health-behavior change after formal Cardiac Rehabilitation treatment at a southern New Hampshire community hospital. Cardiac Rehabilitation treatment encompassing lifestyle behavior change is associated with a significant reduction in morbidity and mortality in individuals with Coronary Heart Disease. However, evidence that adherence to lifestyle behavior change recommendations diminishes significantly within six months of treatment suggests that noncompliance is a significant barrier to the secondary prevention of a disease with prodigious consequences. Accumulating evidence that Cardiac Rehabilitation treatment encompassing extended duration of contact with the treatment team is associated with long-term health-risk behavior change as well as significantly fewer clinical events provides rationale for development of this program. Consistent with the identified outpatient treatment program, the proposed aftercare program aims to achieve significant and sustained changes in risk-factor related lifestyle behavior areas. Based on the conceptualization that behavior change is an ongoing dynamic process that encompasses repeated cycles of relapse, the program provides ongoing telephone sessions over the first year after discharge from the outpatient program. The Transtheoretical Model of Change as it interacts with the principles of Motivational Interviewing provide the foundation for planning and facilitating interventions that are relevant to the patient during each contact. The RE-AIM Model guided the development and formative evaluation of the program. The proposed plan for summative program evaluation is based on guidelines provided by the American Association of Cardiovascular and Pulmonary Rehabilitation, and assesses outcomes in Health, Clinical, Behavioral and Service Domains. Barriers to implementation of the proposed program include financial issues as they interact with

the necessity for provider training and the current economic environment that impedes the implementation of adjunct programs within the health-care system.

Keywords: cardiac rehabilitation, lifestyle behavior change, adherence,

Transtheoretical Model of Change

Chapter 1

Coronary Heart Disease (CHD) is the single largest cause of mortality and disability in the United States (American Heart Association, 2006). Evidence that risk for future CHD events is significantly higher for individuals who already have CHD, (Benhorin, Moss, & Oakes, 1990; Kannel, Sorlie, McNamara, 1979; Ulvenstam et al., 1985) has made the rehabilitation and secondary prevention of CHD a compelling focus within the health care system. While Cardiac Rehabilitation programs aimed at lifestyle risk-factor modification have become standard of care in the secondary prevention of CHD related morbidity and mortality, lack of long-term maintenance of lifestyle changes has become a central focus. This dissertation describes a tele-health follow-up program designed to promote long-term compliance after outpatient cardiac rehabilitation treatment at a community hospital in southern New Hampshire.

Secondary Prevention of Coronary Heart Disease

Coronary heart disease (CHD) is associated with numerous risk factors that both include and are mediated by behavior. Evidence that smoking, poor diet, sedentary lifestyle, depression and anxiety directly impact physiologic processes that potentiate CHD has impacted efforts to prevent its development by intervening to modify these risk factors. Efforts at secondary prevention have become standard of care for individuals with CHD who are at substantially increased risk for further manifestations of the illness. The development of multifactorial cardiac rehabilitation (CR) programs for individuals who struggle with the manifestations of CHD has yielded substantial evidence that exercise, health education, and psychosocial interventions decrease behavioral and biologic risk factors, positively impact the pathophysiology of the disease, and substantially decrease the incidence of morbidity and mortality. In their recent review of an extensive literature pertaining to clinical outcomes Williams et al. (2006) found

substantial evidence that CR positively affects the pathophysiology of CHD, decreases incidence and extent of disease-related disability, increases quality of life, and reduces the risk of subsequent morbidity and mortality in relatively cost-effective manner.

Statement of the Problem

While there is abundant evidence demonstrating that outpatient cardiac rehabilitation reduces risk factors, delays disease progression and reduces mortality, evidence for ongoing attainment and maintenance of these fundamentally important changes is disappointing. Recognition that adherence to CR recommendations is diminished to less than 50% within 6 months after treatment (Williams et al., 2006) suggests that noncompliance is an impressive barrier to the successful impact of CR. While the immediate effects of CR are notable, the necessity of long-term adherence to CR recommendations for improved health outcomes indicates that noncompliance constitutes a failure of treatment.

Lack of adequate follow-up has consistently been identified as a barrier to long-term adherence in CR treatment (Ockene, Hayman, Pasternak, Schron, & Dunbar-Jacob, 2002). Evidence that successful new learning must be situated and tested in multiple and varied contexts (Bouton, 2000) is consistent with accumulating data indicating that extended duration of contact and follow-up support is associated with better outcomes after CR treatment. The necessity of elaborating on treatment that has effected positive health outcomes in the short term seems obvious, and implies the need for program development that attends to this problem in a cost-effective manner.

Proposed Program

The proposed program is an effort to address the problem of compliance in a population of patients who attend the comprehensive outpatient cardiac rehabilitation program in a rural

community hospital in southern New Hampshire. Consistent with the theoretical underpinnings of the identified outpatient CR program, this tele-health after-care program was developed based on data indicating the utility and necessity of follow-up intervention to facilitate and maintain lifestyle behavior change in order to reduce morbidity and mortality in individuals with existing coronary heart disease. Structured by the RE-AIM framework (Klesges, Estabrooks, Dzewaltowski, Bull, & Glasgow, 2005), its conceptualization is guided by the Transtheoretical Model (TTM) of behavior change, and utilizes interventions consistent with the Motivational Interviewing (MI) method to develop an individualized plan to facilitate and maintain the change process after discharge. The underlying structure of an ongoing collaboration between the outpatient CR Department and a training clinic affiliated with a local clinical psychology doctoral program makes this program uniquely situated to trial an aftercare program that extends the duration and frequency of behavior change interventions beyond the standard program without substantially extending the financial burden of treatment.

The proposed program encompasses scheduled telephone follow-up sessions to assess progress, identify new symptoms, answer questions and conduct ongoing risk factor and lifestyle counseling for a year beyond completion of the outpatient cardiac rehabilitation program. In doing so, it aims to achieve significant and sustained changes in risk-factor related lifestyle behavior areas including stress management, diet, exercise habits, and tobacco use in patients who have completed outpatient cardiac rehabilitation treatment. Continuous with the outpatient CR protocol, the proposed program evaluation attends to the overall question of effectiveness as well as generalizability according to the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR, 1995). While ongoing formative evaluation guided program

development, summative evaluation assesses outcomes in the health, clinical, behavioral and service domains.

Chapter 2: Literature Review

The vast literature attending to the prevention of coronary heart disease (CHD) is reflective of the significant human and financial cost it effects. Identification of risk factors that contribute to the evolution of the disease process highlights the degree to which behavior is implicated in its manifestation. The short-term behavior change associated with cardiac rehabilitation (CR) has had a substantial impact on reducing risk factors associated with the disease. However, the problem of compliance, or sustained behavior change, is well documented. Research clarifying the contextually dependent nature of successful new learning suggests that compliance requires CR interventions in multiple and varied contexts. Data indicating that extended duration of contact and follow-up correlates with greater compliance and better clinical outcomes suggests that these factors provide necessary contextual complexity. Response to the problem of compliance to CR recommendations, then, requires program development that provides this complexity.

Coronary Heart Disease

Coronary Heart Disease kills more people in the United States than the next four most common causes of death combined. The lifetime risk of developing CHD after age 40 in this country is 49% for men and 32% for women (AHA, 2006). Moreover, the sequel of CHD is the most common reason for long-term disability benefits and premature retirement from work (United States Department of Health and Human Services [USDHHS], 1995). Roughly 12 million adults in the United States suffer with CHD. In 2008, an estimated 1,375,000 Americans suffered a coronary event, and more than 650,000 died of CHD. The estimated direct and indirect costs of CHD in 2008 were \$142.5 billion. The enormity of personal and public health impact of such a disease cannot be ignored, and commands ongoing reflection and action related to

lessening its occurrence, recurrence and pervasive negative impact.

Notably, the death rate from CHD has declined by over 50% since the 1970s, with a 30.2% decline since 1993 (AHA, 2006). Advances in the acute medical intervention of myocardial infarction (MI) including pharmacological thrombolysis, as well as invasive procedural interventions including percutaneous transluminal coronary angioplasty (PTCA), stent placement, and coronary artery bypass graft surgery (CABG) in patients with established CHD are identified as predominant contributors to this decline (Hunink et al., 1997).

Importantly, however, between one-third and one-half of the decline in CHD mortality observed between 1950 and 1989 has been attributed to changes in risk factors which are specific to the development and maintenance of the disease. Further, because risk factor reduction is thought to have the potential to continue to reduce overall rate of heart attacks and CHD deaths by at least more than 20% by 2010, (U.S. Department of Health and Human Services [USDHHS], 2000) ongoing efforts to impact such change are essential.

Pathophysiology. Coronary heart disease (CHD) refers to a category of syndromes caused by atherosclerosis, or blockage of the flow of blood in the coronary arteries (USDHHS, 1995). The clinical manifestations of CHD include stable and unstable angina pectoris, myocardial infarction (MI), and sudden cardiac death. In CHD, deposits of smooth muscle cells, endothelial cells, platelets, lipids, cellular waste products, calcium and a clotting factor known as fibrin in the endothelial lining of the coronary arteries harden over time. These deposits can threaten heart functioning by effecting arterial narrowing and hardening which potentially limits or completely obstructs blood flow to proximal cardiac muscle or by potentiating the formation of blood clots which break off and lead to crucial blockages elsewhere in the cardiac vasculature, (Donker, 2000). Limited flow of blood which carries oxygen essential to healthy cardiac tissue

leads to ischemia, or damage to heart muscle tissue. Chronically, episodes of insufficient blood flow to cardiac tissue often lead to angina pectoris, or pain which may be experienced in the chest, arms, back, neck and jaw, and which can be debilitating and negatively impact quality of life. Acutely, a myocardial infarction (MI) or heart attack, occurs when limited blood flow leads to death of cardiac tissue. Sudden cardiac death is an outcome of the atherosclerotic process when infarction of an area of tissue that is large enough or that is most vital to cardiac functioning occurs.

Risk factors. Evidence that lifestyle-related risk factors contribute substantially to the formation of atherosclerosis makes their management essential to secondary prevention in individuals who experience CHD and its sequelae. Risk factors identified in the development of CHD include smoking, hypertension, elevated serum total cholesterol and low-density lipoprotein cholesterol (LDL-C), low serum high-density lipoprotein cholesterol (HDL-C) diabetes mellitus, obesity, uncontrolled stress and anger, depression and social isolation (Graves & Miller, 2003; McGovern et al., 2001; Sytkowski, D'Agostino, Belanger, & Lannel, 1996; Unal, Critchley, Phil, & Capewell, 2004; Wilson et al., 1998). The degree to which volitional behavior has been implicated in the manifestation of risk for coronary heart disease has led some to characterize it as “predominantly a behavioral disease” (Donker, 2000). The identification of several behavioral risk factors has generated a major effort toward the modification of these factors in CHD patients who are at substantially increased risk for further manifestations of the illness. Modifiable risk factors that are directly related to behavior and impart a direct biological impact include cigarette smoking, elevated serum total cholesterol and low-density lipoprotein cholesterol (LDL-C), low serum high-density lipoprotein cholesterol (HDL-C), hypertension, sedentary lifestyle, and excessive weight (Bellg, 1998; Graves & Miller, 2003). Psychosocial risk

factors constitute a second set of elements which impact the development and course of CHD by way of the intermediary psychophysiological manifestations of stress and negative emotions.

Cigarette smoking has been identified as perhaps the most important risk factor for the development and progression of CHD. In fact, cigarette smoking quadruples the risk of CHD related deaths in middle-aged men and women (Center for Disease Control [CDC], 2004). Substantial evidence implicates smoking as a major contributor to atherosclerotic processes including episodic acute hypertension, increased resistance in coronary arteries, reduced oxygen delivery, impairment of the dilation of coronary artery walls, depression of HDL-cholesterol levels, and an increased propensity for the development of blood clots related to enhanced platelet aggregation and increased fibrinogen production (Rigotti & Pasternak, 1996). Further, the impact of smoking on the atherogenic process appears to be dependent on both dose and duration, portending the value of the decrease and elimination of such behavior to cardiac health.

Indeed, there is substantial evidence that smoking cessation contributes to a significant reduction in morbidity and mortality in patients with CHD. Well over 30 years ago, research indicated that patients who stopped smoking after an initial acute myocardial infarction had a 50% decreased incidence of experiencing a second nonfatal cardiac event or cardiac related mortality (Daly, Mulcahy, Graham, & Hickey, 1983). Multiple studies have confirmed this finding, indicating further that in CHD patients, the risk of subsequent cardiac events declines soon after cessation of smoking, and is practically eliminated after 2 to 3 years. Further, these beneficial effects have been shown to persist for up to 13 years. Despite such heartening evidence, however, 50-66% of those patients who have faced such potentially life-threatening events will still be smoking or have resumed smoking from 6 months to 5 years after their event (Rigotti & Pasternak, 1996) pointing to the need for interventions that facilitate behavior change

in this arena.

Hypertension, or high blood pressure, constitutes another substantial risk factor for the development of CHD. It is estimated that 65 million Americans have hypertension which is defined as a systolic pressure of 140 mm Hg or greater and/or diastolic pressure of 90 mm Hg or greater, (AHA, 2006) and that individuals who are not hypertensive at the age of 55 have a 90 % lifetime risk of developing high blood pressure (U. S. Department of Health and Human Services; National Heart, Lung, and Blood Institute [DHHS, NHLBI], 2003). The positive, continuous and independent association between hypertension and coronary heart disease suggests that the risk beginning at 115/75 mm Hg doubles with each increase of 20/10 mm Hg.

As might be expected, systolic blood pressure is a strong independent predictor of cardiac morbidity and mortality among middle-aged and older women (Mason et al., 2004) and men (Flack et al, 1995) who have existing coronary heart disease. Hence, moderation of high blood pressure in CHD patients is essential to secondary prevention of future morbidity and mortality.

A reduction of only 5-6 mm Hg over 5 years has been shown to decrease the risk of CHD by 20-25%, and by 14% when maintained for only 2-3 years (Collins et al. 1990). Behavioral modifications which have been shown to lower blood pressure include weight reduction in those individuals who are overweight or obese, diet modification, dietary sodium reduction, physical activity and moderation of alcohol intake (DHHS, NHLBI, 2003). In addition, antihypertensive medications are commonly prescribed. Hypertension, then, is a substantial risk factor for the secondary prevention of CHD, the modification of which is dependent upon the behavior of those affected.

Dyslipidemias, or low high density lipoprotein (HDL) cholesterol and high low density lipoprotein (LDL) cholesterol levels, constitute a third set of salient risk factors for the

development of CHD. The direct role of cholesterol in the development of atherosclerosis and CHD is incontestable. A joint effort by the AHA and the National Heart, Lung, and Blood Institute (NHLBI) to review the most prominent studies concerning the relationship between cholesterol levels and heart disease (LaRosa et al., 1990) yielded overwhelming evidence that there is a continuous, positive correlation of elevated serum cholesterol levels to increased CHD risk. The increased risk of CHD is determined by elevated levels of LDL cholesterol greater than 130 mg/dl which promote atherogenesis, and by reduced levels of protective HDL cholesterol of less than 35 mg/dl (Sebregts, Falger, & Bar, 2000).

Notably, clinical trials and epidemiologic data indicate that regulating cholesterol levels not only reduces risk for CHD and decreases overall mortality, but is beneficial for individuals who already experience CHD (LaRosa et al., 1990). Studies of pharmacological treatment of serum cholesterol indicate that medication can reduce total cholesterol and LDL-cholesterol by 25-35%, and reduce mortality in patients with CHD (Sebregts et al., 2000), suggesting that medication compliance is key to secondary prevention of CHD. Further, there is evidence that strict dietary treatment alone can not only modify cholesterol levels substantially, but also lead to actual regression of sclerotic changes in coronary arteries and reduce the incidence of new coronary events by as much as 250% in CHD patients (Ornish et al., 1990; Ornish, Scherwitz, Billings, Armstrong, & Ports, 1998). Further, the addition of even relatively less stringent dietary changes can augment the results of pharmacologic treatment of cholesterol levels by at least 10-20% (Watts et al., 1992). The clinical impact of diet and medication in the modification of cholesterol levels in CHD patients underscores the need for behavioral interventions related to dietary modification and medication compliance.

Sedentary lifestyle is another factor which increases the risk of recurrent cardiac events.

Prospective epidemiological studies indicate a strong association between an inactive lifestyle and coronary heart disease (Berlin & Colditz, 1990). Associated increased risk is presumably related to the link between lack of exercise and other important risk factors for CHD including excessive weight. In patients with existing coronary heart disease, sufficient daily exercise alone is associated with reductions in blood pressure and serum cholesterol, and in depressive experiences, all independent risk factors for CHD (Sebregts et al., 2000). Further, adequate exercise appears to exert a favorable direct impact on relevant physiologic processes including reduced heart rate during exercise and at rest, increased capacity of cardiac muscle tissue to utilize available oxygen thereby reducing oxygen demand, and improved ventricular functioning. In short, even moderate exercise as a sole intervention, defined as 30 minutes of brisk walking each day, or its equivalent, is associated with a reduction in other independent risk factors as well as an increase in relevant physiologic functioning in CHD patients.

While evidence that regular exercise and related cardiorespiratory fitness decreases the incidence and intensity of cardiac risk factors in CHD patients, its isolated effect on clinical endpoints has been of some debate. Likely related to the methodological problems inherent in measuring exercise, multiple studies have exhibited a positive trend, but not statistical significance, in effecting decreased mortality and morbidity (Sebregts, Falger, & Bar, 2000). While the impact of physical training alone on morbidity remains unclear, meta-analysis of studies including more than 4000 CHD patients indicate a 20-24% reduced mortality after physical training (Oldridge, Guyatt, Fischer, and Rimm, 1988; O'Connor et al., 1989). Evidence of the capacity for physical exercise alone to moderate important risk factors for recurrent events as well as to directly decrease mortality advocates intervention that originates and maintains such behavior in patients who experience coronary heart disease.

A link between obesity and coronary heart disease has long been noted. Large population studies have revealed that CHD death rates are directly related to weight as measured by body mass index (BMI). The risk of CHD mortality in obese persons is 2 to 3 times the risk among lean persons (Klein et al., 2004), an effect which is thought to be related to the independent risk conferred by obesity itself, as well as a link to other cardiac risk factors. Obesity is associated with known risk factors of CHD including hypertension, increased total and LDL-cholesterol levels, and reduced HDL-cholesterol levels (LaRosa et al., 1990). Further, a constellation of physical and metabolic abnormalities characterized as the Metabolic Syndrome is associated with obesity, and constitute risk for CHD (Kelin et al, 2004). The characteristics of this syndrome include large waist circumference, insulin-resistant glucose metabolism (impaired fasting glucose, impaired glucose tolerance, and type 2 diabetes mellitus), dyslipidemia (high LDL- and total cholesterol and low serum HDL-cholesterol levels), and hypertension. Individuals who have this metabolic syndrome have a 150% to 300% increased risk of having CHD. As well, data from a 26-year follow up of participants in the Framingham Heart Study revealed that excessive weight predicted increased risk for CHD independent of serum cholesterol, blood pressure, and glucose intolerance (Hubert, Feinleib, McNamara, & Castelli, 1983). Hence, obesity constitutes both a coexisting and independent risk factor for CHD.

The direct effect of weight loss on CHD events and mortality in obese persons is difficult to ascertain, ostensibly related to the common lack of achievement of prolonged periods of sustained weight loss. However, intentional weight loss has been correlated with the modification of obesity-related risk factors for CHD, and is associated with improvement of all features of the metabolic syndrome (Klein et al., 2004). Insulin sensitivity, an essential aspect of glucose metabolism, improves rapidly with the induction of an energy deficit diet even before

much weight loss occurs, and continues to improve with continued and sustained loss. Decreased serum cholesterol levels are associated with weight changes, and increases in serum HDL-cholesterol are observed with sustained weight loss. Finally, intentional weight loss decreases blood pressure in a dose-dependent manner; greater improvement in blood pressure is observed with increased weight loss. Weight loss can prevent hypertension in obese patients as well. Notably, fat loss induced by negative energy balance is necessary to achieve the metabolic benefits of weight loss, implicating dietary intervention and increased physical activity as necessary in efforts to prevent CHD morbidity and mortality in those individuals who experience CHD.

A comprehensive review of research attending to psychosocial influences on the development and course of CHD suggests that hostility, depression, anxiety and negative affectivity, and social isolation all confer substantial risk for CHD-related morbidity and mortality (Smith & Ruiz, 2002). There is substantial evidence that hostility is a risk factor that confers increased risk for the development of CHD, as well as for further morbidity and mortality among those who already have coronary heart disease. A recent review of research concerning the psychosocial influences on the development and course of CHD yields substantial evidence that self-reports of trait hostility and anger contribute to new coronary events among previously healthy people (Smith & Ruiz, 2002). Self-reported hostility has been shown to contribute to the severity and progression of the atherosclerotic process itself, and to predict more rapid restenosis of coronary arteries following angioplasty in individuals with preexisting CHD. Further, in individuals with existing CHD, anger contributes to ischemia or heart muscle damage, with multiple studies suggesting as much as a two-fold increase in the likelihood of acute myocardial infarction subsequent to the arousal of anger.

Negative emotions other than anger have also been found to confer increased risk of CHD (Smith & Ruiz, 2002). In their comprehensive review of psychosocial influences on the evolution and course of CHD, the authors observed that a number of methodologically sound studies of initially healthy populations have shown that depression, anxiety, and hopelessness predict future coronary events including myocardial infarction and coronary death. Further, the authors cite multiple studies in which depression, anxiety, and pessimism are even stronger predictors of coronary events and decreased survival in those individuals with preexisting CHD. Approximately 20% of patients with cardiovascular disease experience clinical depression (Musselman et al., 1998). Patients who experience depression directly following MI are 3.5 times more like to die (Frasure-Smith, Lesperance, & Talajic, 1993) than those patients who are not depressed. Notably, the negative impact of depression and other indicators of emotional distress is significant regardless of the severity of initial illness.

Both physiological and behavioral pathways are thought to constitute the link between depression, anxiety, and negative affectivity and CHD (Smith & Ruiz, 2002). There is a substantial body of evidence suggesting that the mechanism linking anger and hostility to CHD and the potentiation of coronary events in the context of preexisting coronary artery disease is composed of the psychophysiological correlates of stress and negative emotion. Individuals with increased hostility exhibit greater psychophysiological responses to stressors, and are less likely to respond to social support with a reduction in the cardiovascular and neuroendocrine reactivity that appears to contribute to coronary disease and events. Autonomic processes including heightened sympathetic activity and decreased parasympathetic responsivity have been identified as the physiological link between anxiety and depression and CHD. Further, like anger, anxiety and depression are associated with behaviors which do not promote healthy relational

connection, thereby contributing to social isolation and low levels of perceived social support, both independent risk factors for CHD events and particularly in patients with preexisting CHD (Angerer et al., 2000).

Cardiac Rehabilitation

Identification of risk factors for recurrent coronary events in individuals who experience CHD has contributed to the development of secondary prevention efforts by way of cardiac rehabilitation programs. Now advocated as standard of care for CHD patients (American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), 1995; American Heart Association (AHA), 1994, 2005; USDHHS, 1995), comprehensive cardiac rehabilitation programs encompassing various aggregations of exercise, cardiac risk factor modification, and educational and counseling components have evolved.. Cardiac rehabilitation/secondary prevention programs were initially developed in the 1960s based on awareness of the benefits of prolonged exercise after acute coronary events. The shortening of inpatient hospitalized care for cardiac patients lead to a focused effort to provide structured out-patient rehabilitation programs that would ensure safe physical conditioning with the aim of the patient's return to previous levels of functioning. While physical conditioning was the primary focus of early programs, the development of a more comprehensive approach was foreshadowed in the World Health Organization's (WHO) definition of cardiac rehabilitation as early as 1964. The WHO's definition of cardiac rehabilitation as the "sum of activities required to ensure cardiac patients the best possible physical, mental and social conditions so that they may by their own efforts regain as normal as possible a place in the community and lead an active, productive life" (WHO, 1964) alluded to the necessity of preventive care that went beyond physical conditioning.

Evidence that a combination of risk factors have an interactive-cumulative effect on the

total risk for CHD, with the cumulative effect contributing more than the sum of separate risk factors alone (Perkins, 1989) has led to a multifactorial focus in many cardiac rehabilitation programs. In 1994, the AHA specified that cardiac rehabilitation should not be limited to exercise training, but should also include a multidisciplinary and multifaceted approach focused on the reduction of all modifiable risk factors (AHA, 1994). The U.S. Public Health Service (Feigenbaum & Carter, 1988) broadened the definition of cardiac rehabilitation to include services which are “comprehensive, long-term programs involving medical evaluation, prescribed exercise, cardiac risk factor modification, education, and counseling. These programs are designed to limit the physiologic and psychological effects of cardiac illness, reduce the risk for sudden death or reinfarction, control cardiac symptoms, stabilize or reverse the atherosclerotic process, and enhance the psychosocial and vocational status of selected patients.” This acknowledgment of the fundamental nature of multiple and interrelated risk factors reinforced continuing efforts to identify, initiate and evaluate interventions within the configuration of predominantly outpatient cardiac rehabilitation programs.

Accumulating evidence that rehabilitation programs encompassing health education and psychosocial interventions yield substantial reductions in cardiac mortality, recurrence of myocardial infarction (MI), and restenosis after revascularization procedures (Aldana, et al., 2003; Gordon & Haskell, 1997; Haskell, et al., 1994; Lisspers, et al., 1999; Ornish, 1998; Sundin, et al., 2003, 2005; Wallner, et al.) as well as a moderator effect for proximal targets including risk factors, related behaviors and emotional distress (Dusseldorp, Van Elderen, Maes, Meulman, & Kraaij, 1999; Linden, 2000; Linden, Stossel, & Maurice, 1996) has contributed to the recommendation by the American Heart Association in conjunction with the American Association of Cardiovascular and Pulmonary Rehabilitation (Balady et al., 2000) that

psychoeducational and psychosocial interventions constitute core components of comprehensive multifactorial programs for lifestyle behavior change in cardiac rehabilitation.

Despite the relative recency of multifactorial secondary prevention efforts for those individuals with CHD, there has been an abundance of research concerning the state and efficacy of cardiac rehabilitation services. The Agency for Health Care Policy and Research's extensive review of scientific literature (Wegner et al., 1995) substantiated the efficacy of multifactorial cardiac rehabilitation programs in the improvement of exercise tolerance, symptoms, blood lipid levels, smoking behavior, psychological well-being, stress management and a marked reduction in morbidity and mortality when compared to usual medical care that does not encompass cardiac rehabilitation (CR). The recent decision by the Centers for Medicare and Medicaid Services to expand the clinical indications for cardiac rehabilitation was supported by a review of current clinical evidence indicating that CR positively affects the pathophysiology of coronary artery disease, the extent and level of quality of life, and incidence of morbidity and mortality in younger and older men and women who experience the multiple manifestations of CHD and associated difficulties including not only acute myocardial infarction, coronary artery bypass graft surgery, angina, and percutaneous coronary intervention, but also chronic heart failure, heart transplantation and heart valve replacement (Williams et al., 2006). Notably, in an aging population wherein increasingly successful treatment has effected a shift of CHD-related illnesses from acutely fatal events to chronic disease, cardiac rehabilitation programs that help patients improve their quality of life, lessen symptoms, increase functional capacity, decrease disability and reduce risk of subsequent morbidity and mortality have become the standard of care for individuals who experience the common troubling manifestations of CHD.

Cardiac psychology. Increasing awareness that psychological factors cardiac psychology

is an area of specialization that contribute to the development of CHD and that behavior change is a significant component of prevention has led to the development of “cardiac psychology.” Within the field of health psychology which is concerned with how the mind and behavior interact to influence physical health and illness, identifies psychosocial risk factors for the development and perpetuation of cardiovascular disease and the psychological sequelae of cardiac illness...[and] is a multidisciplinary effort that attempts to prevent or minimize serious medical and psychological complications as a result of these risk factors, and, hence, to optimize patients’ medical and psychosocial outcomes (Fisher, 1995, p. 125).

The practice of cardiac psychology has become an integral aspect of cardiac rehabilitation programs wherein the intervention with CHD patients does not require the diagnosis of psychiatric “disease” per se (Allan & Scheidt, 1996). Rather, it encompasses the illumination of the interactive role of lifestyle behaviors and psychosocial sequelae of heart disease and the psychological interventions necessary for the prevention and rehabilitation of pertinent risk factors. A fundamental aspect of cardiac psychology, then, is the practice of impacting sustained behavior change that will decrease risk factors.

Compliance: Sustained behavior change. The positive outcome of short-term behavior change as it impacts the secondary prevention of cardiovascular risk in CR treatment is well established. However, there has been much less progress in promoting these changes following CR treatment. The proposed program was developed to attend to the overall problem of compliance, or the long-term attainment and maintenance of risk factor lifestyle changes after cardiac rehabilitation. Notably, the terms compliance and adherence are often utilized interchangeably in the CR literature, and therefore throughout this dissertation. However, it is worth noting that while they are often understood to denote long-term attainment of prescribed

lifestyle behaviors in this arena, their distinction at a deeper level of discourse suggests that the term adherence may be most compatible with the spirit of this particular program. While compliance denotes an acquiescence or yielding as a function of force, the reference to support of or attachment to in the definition of adherence suggests a collaborative process (Guralink, 1980) that more accurately characterizes the collaboration between patient and therapist that is fundamental to the proposed program. Nevertheless, the problem of long-term attainment of lifestyle behavior change in CR patients has been well documented (Ades, 2001; Bellg, 2003; Gordon and Haskell, 1997; Graves & Miller, 2003; Jeffrey et al., 2000; Oldridge, 1984; Ockene et al., 2000; Scales, 1998; Wegner et al., 1995). For example, Oldridge (1984) found that 50% of patients who enroll in CR exhibit poor adherence to behavior change recommendations in the first 6 to 12 months. The U.S. Department of Health and Human Services reported that patient adherence to CR regimens including exercise, dietary change, smoking cessation and taking prescribed medications is only 25-40% after 6 months. Further, it appears that there is consistent variability in the time course of relapse across different individual risk factors. For example, most weight loss relapse begins 6 months after treatment (Jeffrey et al., 2000) and most smoking relapse occurs sometime before a 6 month follow-up (Ockene et al., 2000). Meta-analysis reveals that risk-reducing effects of psychosocial interventions also diminish over time, becoming insignificant 2 years after the original rehabilitative efforts (Linden, Stossel & Maurice, 1996). In short, after completion of CR treatment, noncompliance is not the exception, but the rule.

While the efficacy of CHD lifestyle risk-factor reduction is well established in clinical trials of CR treatment, the extent to which secondary prevention is effective in practice depends largely on long-term compliance with recommendations for CHD risk related lifestyle behavior change. Because improved health outcomes are reliant upon sustained health behavior changes,

short-term adherence, while necessary, is insufficient. In fact, because the eventual consequence of noncompliance is often so costly, Bellg (1998) suggests that short-term adherence to manage chronic risk factors is simply a failure of treatment. Since compliance is particularly low when a variety of health behavior changes are indicated simultaneously (Dunbar-Jacob, Burke, & Puczynski, 1995) understanding and attending to the problem of compliance as it relates to the secondary prevention of CHD is particularly compelling.

Concern about clinical efficacy along with current demands for efficiency and cost-effectiveness compel ongoing efforts to further develop approaches to the secondary rehabilitation of CHD patients that more effectively promote ongoing adherence to lifestyle risk-factor recommendations. The American Heart Association's call to action for a multilevel approach to this challenge (Miller, Hill, Kottke, & Ockene, 1997) identified the need for identification and implementation of strategies at the level of patient, provider and organization. Proceedings of that conference included a summary of current learning research that calls into question previously held key ideas concerning the process of behavior change, bringing attention to the crucial element of time as it relates to duration and interval of treatment.

In an attempt to clarify the problem of compliance from a learning theory perspective, Bouton (2000) reviewed current learning research that suggests a kind of instability in the process of behavior change that points to the fundamental importance of extended duration of treatment. Significantly changing how we have understood behavior change, Bouton suggests that the long-held notion of the destruction of original learning as fundamental to that process is mistaken. While the processes of extinction and counterconditioning thought to be involved in almost any method utilized to change behavior have been hypothesized to destroy original learning, contemporary research reveals substantial evidence that original learning actually

survives largely intact. Instead of being destroyed, Bouton reviews studies which reveal that behavior change encompasses a process wherein original learning is elaborated by the assignment of a second “meaning” or behavior to the signal that evoked the original behavior. The signal, then, becomes ambiguous because it is now attached to two different behaviors, the expression of which will be determined by context. In fact, context is essentially operative in three fundamental recovery effects related to the process of extinction and thought to constitute mechanisms underlying lapses in behavior change including renewal, spontaneous recovery and reinstatement.

While conditioning generalizes fairly readily across contexts, extinction does not. In the case of the phenomenon known as the “renewal effect,” conditioning that occurs in just one context is easily generalized to the same context that extinction is conducted in, and even to a third context. However, even after all measurable responding is eliminated in extensive extinction training, simple presentation of the original signal in the original context leads to a robust recovery of the original learning. In other words, extinction performance, or the evocation of new, healthier behaviors, depends on testing in the specific context in which the extinction was learned, while the original learning is easily evoked in potentially a multitude of contexts. The originally conditioned response, in the case of health-risk behavior, is more easily renewed than previously thought, while the process of extinction is much less vigorous suggesting that, in order to be robust, the extinction of health-risk behaviors requires extinction performance in the multiple contexts within which it was originally learned.

A second effect, known as spontaneous recovery, is posited to be a particular instance of the renewal effect. In this case, the return of an extinguished response is simply related to the passage of time. Because the passage of time creates a variety of changes in the background

context, Bouton (2000) suggests that this process is most clearly understood as another context effect. Therefore, spontaneous recovery is understood as a renewal effect that happens when the extinguished behavior is presented in a new temporal context. This is certainly consistent with the observation that fewer than half of individuals who have completed traditional CR treatment are compliant after only 6 months.

A third recovery effect, reinstatement, is controlled by conditioning of the context. In this case, a few noncontingent exposures to the significant event after extinction of original learning has occurred can lead to original behavior returning if the signal is then presented again in the same context. In other words, when the significant event is presented after extinction, it is associated with the contextual cues that are present. This causes the context to arouse an expectation of the event which then triggers original responding when the signal is presented there again. Simply the expectation of the original reward in a specific setting, then, can excite behavior there again. So, for example, the reformed overeater who once habitually overate while feeling the negative affect related to pressure to perform a certain task while at work will readily lapse when food is made available in the presence of the specific work setting or when those same negative effects are present.

Simply stated, Bouton's review suggests that renewal and reinstatement effects leave health-risk behavior change highly dependent on the current context. Behavior change or extinction that occurs within the CR context is highly vulnerable to lapsing after CR treatment ends because an individual is exposed in an ongoing manner to a complex array of contextual cues that are likely to trigger retrieval of the original learning, or reinstate unhealthy behaviors. Importantly, this suggests the need for comprehensive identification of contextual conditions associated with the original learning not only in the service of teaching the individual to avoid

these conditions, but also because new learning or behavior change methods need to be conducted directly in those contexts. Notably, context seems particularly important in terms of retrieving the second thing learned, making the role of the therapeutic context itself extremely important. After extinction, or behavior change elicited by CR treatment, the original unhealthy behavior is still “on” unless the extinction context switches it off. Consequently, recovery effects like renewal and spontaneous recovery result partially from a failure to retrieve the newly learned healthy behavior when the contextual cues of CR treatment end. In addition, in the case of spontaneous recovery, simply the passage of time beyond CR treatment becomes a contextual cue that leaves an individual vulnerable to lapsing into health-risk behaviors once again. In short, the end of circumscribed CR treatment means lost opportunity for behavior change learning in the face of the myriad contextual cues that are likely to retrieve the original learning, or unhealthy behaviors. Further, it leaves unavailable the contextual cues that are most likely to keep the unhealthy behaviors at bay.

The elaboration of learning theory encompassing current research has important implications for understanding and managing the problem of compliance for CR patients. The likelihood that ongoing acquisition and long-term maintenance of changed behavior will be promoted by situating new learning within relevant contexts , varying the contexts in which new learning takes place and providing retrieval cues after new learning has taken place suggests a need for further elaboration of CR treatment. The necessity of situating new learning within multiple and varied relevant contexts and extending the availability of the CR context itself obviates the need for increased contact with CR treatment staff beyond the confines of the currently circumscribed outpatient CR setting.

Consistent with the implications of new information and related learning theory

development, the need for extended duration of contact and follow-up toward increasing behavior change and long-term compliance with heart healthy lifestyle recommendations is frequently identified (Ades, 2001; Bellg, 2003; Gordon & Haskell, 1997; Graves & Miller, 2003; Scales, 1998; Wegner et al, 1995). This is not surprising given that one of the consistently identified barriers to CR adherence is lack of support (Evenson & Fleury, 2000). Variability in the effectiveness of comprehensive multifactorial lifestyle behavior change rehabilitation programs has been attributed to both the intensity and the duration of direct contact between patient and cardiac rehabilitation staff (Nordmann, Heilmbauer, Walker, Martina, & Battegay, 2001). In accordance with these attributions, a consistent factor in comprehensive cardiac rehabilitation programs with positive outcomes when compared to standard medical treatment without CR efforts (Aldana et al., 2003; Lisspers et al., 2005; Ornish, 1998; Ornish et al., 1990, 1998; Quinn, Alderman, Facc, McWilliam, & Haskell, 1994; Wallner et al., 1999) is a duration and frequency of patient- provider contact that significantly exceeds the 6-12 week duration of standard cardiac rehabilitation programs. Multiple studies have demonstrated that interventions with an aggressive focus on the modification of risk-factor-related lifestyle behaviors for CHD with long duration of contact and follow-up can retard or reverse the progression of coronary artery disease (Ballantyne, 1998; de Feyter, Vos & Deckers, 1995; Gould et al., 1992; Haskell et al., 1994; Hoffman-Bang et al., 1999; Lisspers et al., 2005; Manchanda et al., 2000; Niebauer et al., 1997; Ornish, 1998; Ornish et al., 1990, 1998; Quinn, Alderman, McMillan, & Haskell, 1994; Schuler et al., 1992; Sdringola et al., 22003; Wallner et al., 1999; Watts et al., 1992). Perhaps more significantly, interventions with an aggressive focus on lifestyle behavior change correlated with significantly fewer clinical cardiac events including myocardial infarction, percutaneous coronary angiography, coronary artery bypass graft surgery, and death

(Dusseldorp, van Elderenm Maes, Meulman, & Kraaij, 1999; Haskell et al., 1994; Lisspers et al., 2005; Ornish et al., 2001; Sdringola et al., 2003; Wallner et al., 1999).

Notably, while there is abundant data to support the conjecture that longer duration of contact correlates with positive clinical outcomes, few studies have compared standard CR treatment with that which is followed up by intervention of longer duration. To be most relevant to current clinical practices, studies that investigate multifactorial interventions aimed at prevention of behavioral recidivism and risk factor deterioration after CR treatment when compared to standard CR are necessary. Two such studies, while differing in the intensity and duration of intervention, offer data that is particularly useful in highlighting the clinical importance of extending treatment beyond standard CR treatment.

The Extensive Lifestyle Management Intervention (ELMI) trial (Lear et al., 2003; Lear et al., 2006) was developed in response to evidence of the need for follow-up CR interventions to support and sustain lifestyle behavior change while also attending to the problem of health care costs. Described by the authors as a modest intervention, the ELMI randomized 302 patients who had completed a standard CR intervention to either usual care or an intervention based on a case management model. While individuals in the usual care group were encouraged to follow-up with their physicians after CR, they had no contact with CR staff beyond standard outpatient treatment. The intervention group participated in six cardiac rehabilitation sessions, six telephone follow-up contacts and three lifestyle and risk factor counseling sessions the first year after CR, and four telephone follow-ups and two lifestyle and risk factor counseling sessions the second, third and fourth year with lifestyle and risk factor outcome assessment performed at each 12-month mark. The six cardiac rehabilitation sessions were conducted to facilitate the development of a home-based exercise program. Telephone follow-up calls were utilized to assess progress,

provide counseling, identify new symptoms and answer questions. Risk factor and lifestyle counseling sessions were conducted to assess risk factors as well as medications, medication compliance and symptoms. Ongoing development of individually tailored treatment allowed for referral for additional counseling, further work with a dietitian or exercise specialist, or referral to physician for further medication management. At the end of 48 months, the ELMI participants received an average of 15 hours and 35 minutes of intervention. While assessment at 1 year revealed only modest nonsignificant benefits, after 4 years the intervention group experienced a significantly greater reduction in ischemic heart disease global risk as measured by the Framingham risk score.

The Global Secondary Prevention Strategies to Limit Event Recurrence After Myocardial Infarction (GOSPEL) Study (Giannuzzi et al., 2008) was designed specifically to assess the efficacy of two secondary prevention programs with different duration and intensity of intervention following standard CR treatment. Perhaps the largest prospective study of its kind, the GOSPEL Study randomly assigned 3087 patients who had completed standard outpatient CR treatment in 78 Italian cardiac rehabilitation centers to either a 3-year-long follow-up treatment regimen group, or usual post-CR care encompassing follow-up visits with their physicians. The experimental intervention regimen consisted of monthly comprehensive cardiac rehabilitation sessions with one-to-one support for the first 6 months, and then every 6 months for 3 years. Each session consisted of 30-minutes of supervised aerobic exercise combined with an hour-and-a-half of lifestyle and risk factor counseling and reinforcement of prevention interventions. At 3- year follow-up, the intensive intervention decreased clinical endpoints of cardiovascular mortality plus nonfatal myocardial infarction (MI) and stroke by 33%, and nonfatal MI by 48% compared to usual care. While lifestyle habits improved in both groups, the

improvement was significantly larger for physical activity, stress and dietary habits in the intervention group, confirming previous findings that the gains for risk factors and lifestyle behavior achieved with initial cardiac rehabilitation treatment are more successfully maintained over time with follow-up intervention.

The results of the ELMI and GOSPEL studies indicate that extended duration of contact in the service of interventions aimed at lifestyle behavior and risk factor modification effects compliance, decreases risk factors, and significantly reduces cardiovascular events when compared to CR without follow-up. These results support the conjecture that follow-up interventions can provide the contextual variability required for successful new learning and retrieval of newly learned healthy behaviors in the face of cues that would otherwise call up previously learned unhealthy behaviors. These studies lend support to the utility of developing follow-up interventions after standard outpatient CR programs.

Tele-health: Telephone counseling. Tele-health is defined as “the use of telecommunications and information technologies to provide access to health information and services across a geographical distance, including (but not limited to) consultation, assessment, intervention , and follow-up programs to ensure maintenance of treatment effects” (Gleuckauf, Pickett, Ketterson, Loomis, & Rozensky, 2004, p. 615). Increasingly, health care is being provided utilizing various methods of tele-communication to enhance access, availability, quality and cost-effectiveness in medical, mental health and behavioral health arenas. Still a newly emerging discipline, tele-health outcome research is slow to develop. While multiple studies have reported that health care consumers experience moderately high satisfaction and comfort with tele-health interventions (Stamm, 1998) there is slow progress in research concerning patient outcomes and cost-effectiveness. Nevertheless, limited studies of tele-health

interventions utilizing telephone contact with chronically ill patients have yielded positive outcomes (Glueckauf and Ketterson, 2004).

While clinical outcome studies focusing on tele-health interventions in cardiac rehabilitation populations are sparse, there is burgeoning evidence that telephone counseling is a beneficial tool in this arena. Studies of tele-health interventions in various rehabilitation populations report similar or better clinical outcomes when compared to conventional interventions with a trend toward particularly positive impact in the areas of adherence and compliance (Kairy, Lehoux, Vincent, & Visintin, 2009). In addition to substantial support for telephone counseling in the general area of risk behavior change (Ockene et al., 2002), studies specific to cardiac rehabilitation treatment that encompasses telephone contact with care providers show positive outcomes in medical-clinical outcomes and compliance (Ades et al., 2000; Sparks, Shaw, Eddy, Hanigosky, & Vantrese, 1993). Taken with evidence that the more aggressive and enduring cardiac rehabilitation programs that yielded positive outcomes often encompassed telephone counseling as a major component, the limited body of evidence supports the use of telephone counseling to increase access and promote compliance in the cardiac rehabilitation population .

Chapter 3: The Program

This dissertation outlines an aftercare program intended to address the problem of long-term compliance to lifestyle risk-factor recommendations in the CR population of a rural New England community hospital. The development of the proposed tele-health follow-up program has been an organic process related to developing awareness of the needs of the specific population of the out-patient CR program. Originally, the integration of a health psychology component to the hospital-based program evolved out of the collaboration between the Cardiac Rehabilitation Department of a community hospital in southern New Hampshire and the training clinic affiliated with a local clinical psychology doctoral program. Lewis (2001) describes the development of this collaborative effort based on the methodology of local clinical science (see Stricker & Trierweiler, 1995) wherein responsiveness to the specific clinical context is paramount. The proposed aftercare program is the outcome of continued collaborative efforts to attend to the needs of this specific population of CR patients. Poor attendance to an aftercare support group for patients who had completed the CR program drew attention to the need for follow-up efforts responsive to the needs of this rural New England patient population. Patients with a recent history of CHD-related events attend this program three mornings a week for six consecutive weeks. In addition to a supervised monitored exercise component provided by CR staff, the integration of psychosocial interventions aimed at facilitating behavior change has taken various forms. Throughout the inception and development of the proposed aftercare program, the supervising psychologist and doctoral students facilitated psychosocial intakes, collaborated with each patient to individualize a plan for health-risk behavior change, provided individual psychotherapy for high risk patients, performed outcome research and facilitated psychoeducational support groups. Sadly, recent funding cuts at the identified site have

necessitated draconian cuts to the psychosocial component provided by psychology staff eliminating all but the weekly psychoeducational support group. While this change calls into question the issue of funding as it relates to providing the services encompassed in the proposed program, it would seem to indicate an even more pronounced need for the proposed aftercare contact intended to promote and maintain the lifestyle behavior changes so necessary for secondary prevention of CHD.

Methodology

The RE-AIM framework served as a guide for the development of the proposed aftercare program that draws on current health behavior change research but also maps effectively onto the specific practice environment. The RE-AIM framework (Klesges, Estabrooks, Dzewaltowski, Bull & Glasgow, 2005) was designed to organize health behavior change intervention efforts that are consistent with current research findings but also applicable to the practice environment to facilitate eventual dissemination to the broader arena of health promotion. In an effort to enhance the design and planning of health behavior change interventions that are effective and translatable, the authors provide guidelines for ensuring both internal and external validity elements of research design and evaluation. This program was developed with attention to the five dimensions of Reach, Efficacy, Adoption, Implementation and Maintenance.

The Reach dimension of the RE-AIM framework identifies the percentage and representativeness of individuals who are willing to participate in a program as an essential element of successful health behavior change intervention. Notably, the patient population of the identified CR program makes this dimension particularly important. Evidence that risk factor modification may require a minimum of 1 year to induce changes (Merz & Rozanski, 1996) taken with compelling evidence that frequent ongoing patient-provider contact improves

noncompliance rates by 26% to 34% (King, Taylor, Haskell, & Debusk 1988; Miller et al., 1991; Taylor, Houston-Miller, Killen, & Debusk 1990) supports the utility of follow-up intervention for standard CR treatment. Importantly, an aftercare program that provides accessible long-term follow-up is likely to have particular importance in the patient population of the identified CR program. Consistent with the local clinical science perspective, the program aims to be responsive to the characteristic needs of this specific patient population. The social desirability response bias documented in this site's population (Doherty, 2002) suggests a relatively heightened vulnerability to noncompliance and therefore, a particular need for ongoing contact after CR treatment. Predominantly Caucasian working-class individuals from small New England communities, Doherty observed that the patients in this program identified with traditional New England and Anglo-American values in their work ethic and stoicism. Evidence that bias toward social desirability correlates with inconsistent and inaccurate self-monitoring of behavior informed Doherty's conclusion that patients at this site may be prey to optimistic biases about their health and functioning that leave them particularly resistant to lifestyle change. My experience as a doctoral practicum student at this site from 2004-2006 was consistent with this observation as patients were often openly ambivalent about encouraged behavioral changes. Consequently, an aftercare program providing consistent ongoing telephone access to psychosocial intervention for a year beyond the CR program was developed to monitor problems that would otherwise go unreported, and provide ongoing support for behavior change and compliance. The relative ease of accessing such a modality attends to the level of ambivalence that likely impeded utilization of the follow-up psychosocial support groups previously offered at this site. The high rate of participation in this after-care effort as it evolved over a two year period supports this notion. A graduated schedule of telephone contact weekly the first month,

bi-weekly for the next two months and monthly thereafter was accessed by the majority of the CR patients at this site with only a few “drop-outs.”

The RE-AIM dimension of Efficacy, or the impact of program interventions on important outcomes, points to the need for outcome assessment in developing a healthcare program that is effective and generalizable. To that end, a model specific to the services provided by contemporary CR programs provided a framework for evaluating the proposed aftercare program (AACPR, 2004). The American Association of Cardiovascular and Pulmonary Rehabilitation (2004) proposes that optimal program evaluation requires outcome measures appropriate for the specific patient population, setting and resources using one or more of the categories identified within health, clinical, behavioral and service domains. Research guidelines specific to cardiovascular outcomes (Pashkow et al. 1995) further refine this process by describing the complexity that attends the interaction of health, clinical and behavioral domains in CR treatment. Simply put, health-related behaviors targeted by CR programs such as diet and stress management influence clinical outcomes such as weight and psychological health that in turn impact important primary health outcomes such as morbidity and quality of life. Indeed, a comprehensive system of outcomes assessment at this CR site reveals a picture that is consistent with these trends. Outcomes tracked by medical staff show improvement in all medically-related clinical categories (Dartmouth-Hitchcock Medical Center, unpublished research). Further, outcomes documented by psychology staff indicate that improvement in medically-related outcomes within the clinical domain such as decreased emotional distress correlate with increased quality of life within the primary health domain in patients who completed the CR program (Doherty, 2002). Extensive and ongoing evaluative efforts at this site, then, provide the scaffolding for outcomes assessment in the health, clinical and behavioral domains identified by

the AACVPR (2004). The service domain encompasses additional factors affecting patient outcomes that dovetail with the Adoption element of the RE-AIM framework.

The necessity of designing a program to enhance its adoption is clearly essential to its success. The authors point out that Adoption, the third element of the RE-AIM framework, is highly dependent on formative evaluation of the intervention setting and staff. Assessing and responding to the needs, preferences and potential barriers of those individuals directly and indirectly involved in a program is a practical method for improving the potential for adoption of proposed interventions. Notably, the proposed program originated with the request of the registered nurse and exercise physiologist who administer the CR program for more effective follow-up between psychology staff and CR patients. Weekly team meetings of CR medical and psychology team members over a 2-year period facilitated the evolution of an initially informal follow-up program that was organic to the team-work process. For instance, in recognizing the utility of accumulating follow-up data for the CR program as well as follow-up intervention efforts, the CR staff eventually identified the need for a specific exit interview by psychology staff as patients were discharged from the 6-week outpatient CR program. The timing of telephone contact was intermittently discussed and eventually evolved into a schedule of weekly contact the first 2 months, bi-weekly contact Months 3 and 4, and monthly contact thereafter for the first year after discharge with more frequent contact for individual patients as deemed necessary by psychology staff. In addition to the formative process, adoptability will be promoted by utilizing questionnaires to measure patient and CR staff satisfaction with the program.

Notably, the importance of attending to potential barriers was particularly relevant to this planning process. The complexity created by a multi-specialty team was evident at specific

points in the evolution of the proposed program and required particular sensitivity to team member preferences. For example, while psychology staff, taking their cues from published research specific to CR follow-up studies, identified the necessity for assessing self-reported compliance with prescribed medication regimens during follow-up telephone intervention interviews, nursing staff clearly disagreed. Despite reassurances that psychology staff would only be assessing the need for referral to medical/nursing staff for specific follow-up instruction about medication, nursing staff was adamant on this point. Therefore, in the interest of adoptability of the program, this area of assessment was eliminated from the follow-up intervention interviews. Understanding and responding to such contextual factors, particularly in the multispecialty arena in which behavioral health change is facilitated, is clearly essential to the adaptability and utility of an intervention program.

The fourth dimension of the RE-AIM framework, or Implementation, addresses the need for participatory methods of formative evaluation in the development and assessment of health-behavior change. The organic evolution of the proposed program over a 2-year period enabled the kind of “built-in” process evaluation that the authors suggest is necessary for modification of a program before it is disseminated. Ongoing evaluation of program participants’ and staff concerns about the program itself enabled psychology staff to plan such elements as timing and length of phone contacts. For example, as the number of participants grew to include a full year’s follow-up outpatient load, psychology staff was able to generally identify practical necessities of the intervention such as the amount of time required to facilitate telephone interventions each week. As patients also identified their own availability for telephone contact, it became evident that of an average of 42 patients participating at any one time, about half required a 10-15 minute interview, roughly 40% of the participants utilized some amount of time between 15 and 20

minutes and there were generally 6-8 individuals who needed 30 minutes or more for each contact. Recognition of these patterns enabled planning of staff time with attention to both staff needs as well as general preferences of participants for time of day etc.

The last element identified by the RE-AIM framework is Maintenance. At the individual level, this element attends to the maintenance and sustainability of individual behavior change. Simply put, the proposed program embodies this element of health behavior change intervention planning. The authors' recommendations, that long-term behavior change is improved with continuing contact between care providers and participants, increased social support, and tailoring interventions to specific barriers to maintenance, correlate with the structural elements of the proposed program.

Conceptual Framework

The endeavor to change the risk factors of those afflicted with CHD is complex and contingent on accurately delineating the processes or mechanisms that influence health-related behaviors. In order to potentiate change, models that attend to the cognitions, attitudes and affects that portend motivational readiness for health behavior change are necessary. The Transtheoretical Model (TTM) of behavior change (Prochaska, DiClemente, & Norcross, 1992) attends to the observation that behavior change occurs in meaningful increments or stages that involve specific tasks and are progressive in nature. The Motivational Interviewing Model (Miller & Rollnick, 2002) integrates key features of the TTM to identify a set of clinical methods to enhance motivation to change by exploring and resolving ambivalence that attends specific stages of the change process.

Transtheoretical Model. The Transtheoretical Model has been proposed as an integrative and comprehensive model of behavior change that embodies the fundamental element

of motivational readiness (Prochaska & DiClemente, 1982, 1983; Prochaska, DiClemente, & Norcross, 1992). Based on research dedicated to answering the question of how people intentionally change their behavior, the Transtheoretical Model identifies the stages of change as well as particular processes that attend these stages, all of which potentiate and are potentiated by an individual's motivational readiness to change. The temporal dimension of change is characterized through the delineation of five distinct stages during which there are predictable shifts in attitudes, intentions and behaviors. A second major dimension describes how these shifts occur by way of the predictable processes that attend movement toward behavior change. Finally, a series of intervening or outcome variables are identified that not only mediate movement between stages but also monitor intervention effectiveness, assess individual progress and indicate potentially troublesome situations that may attend relapse.

The Transtheoretical Model posits that cessation of health-risk behaviors and the acquisition of healthy behaviors involves progression through specific stages. In their research aimed toward explaining the underlying structure of behavior change in individuals with addictive behaviors (DiClemente & Prochaska, 1982; Prochaska & DiClemente, 1983) the developers of the Transtheoretical Model observed that smokers progress through a series of stages including precontemplation, contemplation, action and maintenance in their attempts to stop smoking. Subsequent cluster analysis of this data (McConaughy, DiClemente, Prochaska & Velicer, 1989) indicated an additional stage of preparation, the presence of which has been supported by subsequent research (Prochaska et al., 1992). Further, research isolating these stages of change across a range of health risk behaviors has further identified a spiral pattern of moving through the process wherein individuals often relapse, or regress to earlier stages, but then recycle through the previous stages in a predictable way. Accurate assessment of an

individual's change state is necessary in order to tailor interventions that will be most useful throughout the change process.

The first stage of change, the precontemplation stage, is one in which individuals are unaware of or underaware of their problems. While individuals in this stage may at some level wish to change, they are not seriously considering change or intending to change in the next 6 months. Because those around them are often aware of and affected by their problem behaviors, these individuals often present for help with problematic behaviors related to pressure they experience from others; they often feel coerced. Notably, the resistance that often characterizes individuals in this stage is understood not as an obstacle so much as an opportunity to accurately identify where an individual is in the process of change, and thereby more effectively strategize in the service of change.

Contemplation is the second stage of change in which individuals acknowledge the existence of a problem and are seriously considering the possibility of making a change. However, these individuals are not yet committed to taking action, and often stay stuck in this state of ambivalence for long periods of time. The ambivalence attendant to this stage is related to the struggle between the individual's positive evaluations of the identified behavior and the amount of loss, energy and effort they anticipate will be encompassed in undertaking such a change. Despite notable ambivalence, serious consideration of changing behavior in the next 6 months is the central element of this stage.

Preparation is the third stage of change identified in the Transtheoretical Model. Individuals who fall into this stage both experience intention to change within the next month, and exhibit some increment of action toward that change. Often these individuals have made previous unsuccessful attempts to change, and have learned valuable lessons which they can

utilize to develop a plan that they can believe will be more successful. The specific challenge of this stage is the development of a plan that is acceptable, accessible and effective that will engage the individual's firm commitment to follow through.

The Action stage is one in which individuals actually change their behaviors, experiences or environment in an effort to conquer their difficulties. Individuals who are in the action stage have met a specific target criterion such as abstinence of an unhealthy behavior for a period of from one day to 6 months. The action of this stage involves the actual implementation of a plan for change and requires considerable time, energy and commitment. Notably, the activity during this stage is more directly observable than that of other stages. Therefore, the action characterizing this stage is often misunderstood by clinicians as constituting change without awareness of the less obvious processes necessary for preparation and the often more strenuous work of maintenance.

The last and frequently most challenging stage of behavior change is the maintenance stage. Individuals are considered to be in the maintenance stage when they have not engaged in a targeted problem behavior and consistently performed a new incompatible behavior for more than 6 months. The work of this stage is the consolidation of the gains realized during the action stage. Because individuals cannot identify and avoid every one of the many cues that can trigger problem behaviors, the maintenance stage of behavior change can go on for an indeterminate period that requires continued active commitment to the change process.

Notably, most people who attempt to make health-related behavior changes do not successfully maintain their achievements within the process on their first attempt. Because relapse is actually a predictable aspect of the change process, the Transtheoretical Model conceptualizes a spiral pattern that illustrates how most people actually move through the stages

of change. In this pattern, individuals progress from stage to stage but many will relapse and regress to an earlier stage many different times before achieving behavior change. After a relapse, individuals usually begin progressing through the stages again, and often have a better chance of success during the next cycle. Only some of those people will regress back to the beginning precontemplation stage and remain there for various periods, but most of those individuals eventually recycle back to contemplation or preparation stages.

The second major dimension of the Transtheoretical Model encompasses the *processes* of change. While the stages of change enable an understanding of *when* shifts in attitudes, intentions and behaviors occur, the processes of change identify *how* the shifts occur. Understanding the particular overt and covert activities and experiences that individuals are more likely to engage in during each stage of change enables emphasis on specific processes that will help the individual to progress to the next stage of change.

Processes of change identified by the Transtheoretical Model are cognitive, affective and behavioral strategies and techniques that people use to modify their experiences and/or environments in order to modify a particular behavior. These processes were first identified theoretically in a comparative analysis of recommended change techniques recommended across multiple systems of psychotherapy (Prochaska, 1979), hence the term *transtheoretical*. Multiple subsequent principal component analyses identified ten processes, or broad categories encompassing multiple techniques, methods and interventions, that attend behavior change. The ten processes fall into experiential and behavioral categories.

Experiential processes include consciousness-raising, dramatic relief, environmental reevaluation, social liberation and self-reevaluation. Consciousness-raising involves increasing the individual's awareness of the problem. Feedback is used to loosen defensive barriers to

problem-behavior change. Dramatic relief involves the experience and expression of feelings about an individual's problems and solutions. Environmental reevaluation encompasses an individual's reappraisal of the impact that a problem behavior has on others and the general environment. Social liberation depicts changes in the environment that provide an individual with alternatives of non-problem behaviors. Self-reevaluation refers to the assessment of how one feels and thinks about oneself with respect to a problem, including an appraisal of the pros and cons associated with changing the behavior.

Behavioral process of change include counterconditioning, helping relationships, reinforcement management, self-liberation, stimulus control and interpersonal systems control. Counterconditioning refers to the substitution of alternatives for problem behaviors. Helping relationships involve being open and trusting about problems with caring others, accepting and utilizing the support made available. Reinforcement management encompasses the process of rewards made available by self and others for making changes. Self-liberation depicts believing in the ability to change and making the commitment to act in that regard. Stimulus control refers to the process of avoiding or countering particular stimuli that elicit the problem behaviors. An eleventh process, interpersonal systems control, involves a particular instance of stimulus control addressing the avoidance of particular people who constitute stimuli that elicit problem behaviors as well as the acquisition of connection to individuals who help decrease the problem.

Research related to the integration between the processes and stages of change (DiClemente et al., 1991; Norcross, Prochaska, & DiClemente, 1991; Prochaska & DiClemente, 1983, 1984; Prochaska et al., 1992) revealed that specific change processes are predictably associated with progress through particular stages. During the precontemplation stage, individuals are not likely to process information about their problems, devote time and energy to

reevaluation of themselves or experience emotional reactions to the negative aspects of their problem behaviors. It stands to reason, then, that precontemplators do not feel the necessity to be open with caring others about their problems, and they are unlikely to shift their attention or environment toward overcoming problem behaviors. Consequently, consciousness raising, dramatic relief and environmental reevaluation are the processes likely to be most usefully activated during this stage.

In contrast, individuals who are in the contemplation stage are much more likely to utilize consciousness-raising techniques including observations, confrontations and interpretations, and are able to engage with educational techniques. They are also able to utilize dramatic relief experiences that raise emotions and effect lessening of negative affect as change occurs. As an outcome of successful consciousness-raising processes, these individuals are more able to reevaluate their problems and themselves. Notably, to the extent that their problem behaviors are identified with self-identity, contemplators' reevaluation impacts an alteration of sense of self. The positive valence of this shift likely contributes to the observation that contemplators are also often able to utilize environmental reevaluation processes to understand how their behaviors impact important others in their lives.

Movement through the contemplation and into the preparation stages generally encompasses increasing use of cognitive, affective and evaluative processes of change. Individuals in the preparation stage begin to take smaller steps that involve action, and therefore are beginning to utilize counterconditioning and stimulus control processes to control their negative behaviors and the situations in which those behaviors occur. During the action stage, individuals are more likely to use self-liberation processes. They tend to believe that they are independent enough to make key changes and so effectively utilize behavioral processes

including counterconditioning and stimulus control. Importantly, individuals in the action stage are likely to be able to utilize the support and understanding made available from helping relationships.

Success during the maintenance stage of change utilizes and builds on each of the processes that are used in previous stages. Successful maintenance requires assessment of conditions that are likely to lead to relapse and development of useful alternative responses for coping effectively in those conditions. Counterconditioning and stimulus control processes are most effectively utilized in conjunction with the ability to access positive self-assessment and satisfactory engagement with important others.

Generally speaking, the experiential processes are most successfully utilized to effect movement in the earlier stages of change. Behavioral processes, on the other hand, are more important for understanding and effecting change in the preparation, action and maintenance stages. Because behavior change interventions are likely to be successful to the extent that they pair appropriate change processes with an individual's stage of change, accurate assessment of an individual's stage of change is essential to tailoring and implementing effective health-behavior change.

The third fundamental element of the Transtheoretical Model is a series of intervening or outcome variables that mediate stage movement, monitor intervention effectiveness, assess individual progress toward problem resolution and indicate situations that are likely to be barriers to change (Prochaska, Redding, Harlow, & Velicer, 1994). These outcome variables include decisional balance (the benefits and costs of the behavior change), self-efficacy (an individual's confidence in their ability to change across problem situations), and situational temptations to engage in the problem behavior.

Decisional balance, or an individual's appraisal of the pros and cons of a particular problem behavior, varies predictably with the stage of change (Prochaska et al., 1994). In studies of twelve different problem behaviors, investigators discovered that the pros of continuing a problem behavior always outweigh the cons during the precontemplation stage. Not surprisingly, the opposite is true in the action and maintenance stages. The discovery that an increase in the evaluation of the pros of changing behavior attends the progression from precontemplation to contemplation, and a decrease in the evaluation of the cons attends the progression from contemplation to action, has important implications for behavior change planning. Systematically targeting the increase of the pros for change during precontemplation facilitates the shift to the contemplation stage, while a shift toward decreasing the cons should lead to further progress from contemplation to action.

Self-efficacy and situation temptation are variables that covary inversely along the dimension of state changes. Self-efficacy entails an individual's degree of confidence in his or her ability to abstain from engaging in a problem behavior across a range of specific situations. Situational temptation refers to the degree to which individuals are tempted to engage in problem behaviors when in specific situations such as when they are depressed, anxious or in particular social situations. Self-efficacy increases as temptation decreases in a linear fashion from precontemplation to maintenance stages. While in the precontemplation stage, an individual is likely to experience low self-efficacy while also struggling with high situation temptation. The difference narrows progressively in contemplation and preparation stages such to the point that it is relatively insignificant during the action stage, making relapse a significant risk. In the maintenance stage, temptation is low and self-efficacy is high. Notably, while the level of

self-efficacy is an important predictor of progress in the early stages of change, the opposite is true for the later stages. The higher the self-efficacy during early stages, the more likely individuals are to apply the relevant processes of change. However, this is not true during the action and maintenance stages. Consequently, self-efficacy training is particularly important in the early stages of behavior change.

Transtheoretical Model-based interventions have been found to out-perform best practice intervention programs (Prochaska et al., 2003; Velicer et al., 1999) and successfully applied to myriad problem behaviors (see DiClemente & Velasquez, 2002). TTM describes a process meant to enhance motivation for change by matching style and content of intervention with an individual's degree of readiness for change. Emerging out of a comparative analysis of multiple theories describing the processes of change, extensive research has supported the identification of five stages of change through which an individual progresses in a curvilinear fashion. The identification and substantiation of predictable processes that occur within and between the stages as well as the delineation of predictable intervening variables contributes to a model that provides an essential foundation for planning health-behavior change interventions. Importantly, TTM has played an integral role in the development of motivational interviewing. A method of communication that attends to the ambivalence that accompanies problem-behavior change, motivational interviewing, serves as a salient partner of TTM to effect health-behavior change.

Motivational Interviewing. Motivational Interviewing (MI) is a theory of the underlying mechanisms of psychotherapy that promote behavior change. Evolving over a nearly 30-year period of application and ongoing identification of outcome-relevant aspects of practice, MI is a “skillful clinical style for eliciting from patients their own good motivations for making behavior changes in the interest of their health” (Rollnick, Miller, & Butler, 2008, p. 6). MI was originally

developed by Miller (Miller & Rose, 2009) as an intervention for problem drinking behavior and has subsequently been tested in over 200 clinical trials. Miller and Rose point out that meta-analyses and efficacy reviews indicate that MI is effective with health problems in which behavior change is essential and patient motivation is a challenge, including cardiovascular disease, diet, hypertension, prevention of HIV and others. Motivational interviewing has been utilized in secondary prevention trials to impact behavior changes in individual behaviors that impact coronary heart disease including diet and exercise activity, smoking cessation and medication adherence (Resnicow et al., 2002). Further, MI has been utilized to impact health-behavior change in multiple behaviors at the same time in the cardiac rehabilitation setting (Scales, 1998).

Miller and Rollnick (2002) define motivational interviewing as “a client-centered, directive method for embracing intrinsic motivation to change by exploring and resolving ambivalence” (p. 25). Understanding ambivalence as a normal aspect of human nature, the authors suggest that while being stuck in it impedes capacity for change, passing through it is actually a natural phase necessary to mediate an individual’s motivation for change. In essence, it is ambivalence and its resolution that makes change possible. The therapist’s elicitation of “change talk”, or the individual’s speech about his own reasons for change, develops the discrepancy between present status and a desired goal that underlies ambivalence. MI describes a framework of relational and technical processes that facilitate the ability to access this discrepancy, intensify ambivalence, and resolve it in the direction of change.

Miller and Rollnick (2002) emphasize the interpersonal foundation of motivational interviewing in their delineation of an overarching “spirit” or mindset that is collaborative, evocative and respectful of the autonomy of the individual. Instead of a clinical situation in

which the expert provider tells a passive patient what to do, a partner-like relationship involves exploration and support rather than persuasion which is particularly important in health-behavior change since it is the patient who must enact the change. Consistent with collaboration, MI seeks to identify and activate motivation in the patient, to connect health-behavior change with what the patient cares about. Change is not imposed from without, but rather, fostered within so that it serves the individual's own goals and values. While human nature resists coercion, it is frequently the acknowledgement of individual freedom that allows movement toward change. The three characteristics of the "spirit" of MI provide a mindset that supports successful conversations with patients about behavior change.

Underlying the spirit of MI, Miller and Rollnick (2002) identify four principals that guide the identification and use of specific skills in facilitating the health behavior change process. These general principles include: (a) express empathy through reflective listening, (b) develop discrepancy between the individual's goals and current problem behavior, (c) roll with resistance to change, and (d) support self-efficacy. The expression of empathy reflecting an attitude of acceptance is a fundamental characteristic of this framework. Respectful listening with the intent of understanding the patient's perspective decreases resistance and allows the development of ambivalence necessary for change. The second principle, the creation and amplification of a discrepancy between the patient's current behavior and his or her goals and values, is essential to the change process. Different than the creation of a behavioral gap, or the amount of change to be accomplished, discrepancy has to do with the *importance* of change. The patient's awareness of and discontent with the cost of present behavior is utilized to overcome the inertia of the status quo. The third principal, rolling with resistance, is particularly important since any attempt to counter resistance is highly likely to intensify it. Further, arguing for change eclipses the

opportunity for the patient to hold his own arguments for change and hence eliminates the likelihood that ambivalence will emerge and be resolved. The fourth principal, supporting self-efficacy, supports the client's ability to recognize his responsibility and capacity for changing behavior.

Evidence that researchers and clinicians utilize the motivational interviewing model in conjunction with the Transtheoretical Model in health-behavior change interventions speaks to their compatibility. The MI model's fundamental goal of facilitating an individual's movement through the stages of change is consistent with the Transtheoretical Model. While the Transtheoretical Model provides the picture of change as a series of gradual steps that encompass specific processes and involve multiple tasks, motivational interviewing attends to building the motivation that provides the impetus for the focus, effort and energy necessary to move through the process. Miller and Rollnick (2002) suggest that motivational interviewing is useful throughout the stages of change, building motivation for change in the early stages, and strengthening commitment to change in the later stages.

DiClemente and Velasquez (2002) describe how motivational interviewing style and techniques are useful in facilitating change at each stage of change identified in the Transtheoretical Model. They identify particular patterns of thinking that attend the resistance to change that characterizes individuals who are in the precontemplation stage and describe how the motivational interviewing model harnesses and builds motivation in each case. For example, the reluctant precontemplator is an individual who is generally passively resistant because the information about or effect of their problem is not fully conscious. They describe how careful listening and providing feedback in an empathic manner allows the client the freedom to explore the possibility of change in a nonthreatening manner. Rebellious precontemplators, on the other

hand, have a great deal of knowledge about the problem behavior, but have a heavy investment in it. Rolling with the resistance of these clients is necessary to diffuse the strength of their arguments against change. The resigned precontemplator is often overwhelmed and has little hope for their ability to change. Instilling hope and exploring barriers to change are most useful in enabling these individuals to build their self-efficacy by assisting them in making the decision to make small changes and build on those successes. Finally, the rationalizing precontemplator often feels that they have none of the answers to their own problems, often having figured out the odds of personal risk or truly believing that their behavior is the result of someone else's problem. Empathy and reflective listening are particularly useful with these clients as it allows them to verbalize their rationalizations for the status quo. This allows a loosening of their resistance, and fosters the ability to consider the negative aspects of their behaviors. The characterization of each of these patterns of thinking that are likely to attend the precontemplation stage enables the clinician to tailor interventions that lessen resistance and build the motivation necessary to progress through the process. Generally, the precontemplation stage requires the flexibility provided for in the MI model to allow the client to explore the pros of the decisional balance, or their reasons for maintaining the status quo. Resultant loosening of resistance, then, allows for beginning recognition of the cons of problem behavior.

Contemplation is characterized as a very paradoxical stage of change by MI proponents. While the contemplator's willingness to consider the problem and the possibility of change are reflective of important hopefulness, it is often mistaken for commitment which is not the case. In fact, the contemplation stage is where individuals tend to experience the greatest ambivalence. Because contemplation is the stage in which evaluations of the pros and cons are more or less equal, the task of the clinician is to tip the decisional balance in favor of change. Importantly,

however, the route to this shift toward recognition of the cons of the problem behavior is the individual's acknowledgement of the good things about it. While this loosens the role of resistance in the process, it also lays the groundwork for maintaining change as it occurs. Until the benefits of the problem behavior are recognized, the ability to combat temptation once change is attempted will be lacking.

In the preparation phase, the individual is ready to make a commitment to action. However, ambivalence continues to attend the experience of individuals in this phase. Consequently, the task of the clinician is to assess the degree of commitment to change. Ambivalence at this point is often related, in part, to a lack of knowledge about how to go about making such change. The clinician's job, then, is to guide the client in developing change strategies and in making a realistic assessment of where the challenges to successful use of these strategies are likely to reside. The focus of the preparation stage is the development of a solid, workable change plan in the service of attending to ambivalence, diminishing resistance, and strengthening commitment to change.

In the action stage, individuals implement the plan they have been preparing. Individuals in this stage are committed and active, and therefore, rewarding to work with. However, the ease with which action can be confused with change is an important recognition of the clinician. Taking action is likely to intensify ambivalence as the loss of old lifestyles are experienced and unsuccessful aspects of the change plan come into view. Careful listening to allow ambivalence to surface, assistance with revision of change plans as needed, and building self-efficacy by focusing on successful activity enable long-term success with behavior change.

While the maintenance phase is the final stage of change, it is a dynamic continuation of the change process that is likely to be ongoing. Motivation during this phase is necessary for

consolidation of change. However, despite consolidation, the likelihood of relapse lurks throughout the change process. Because regression to earlier stages of change commonly follows relapse, motivation is necessary to renew or recommence the process through the early stages again. The motivational interview approach and strategies can help an individual to be aware of and resolve renewed ambivalence in their return to earlier stages of change, problem-solve about aspects of the original plan that enabled relapse, and find the motivation to develop a revised plan and put it into action.

The compatibility of the philosophical underpinnings of the transtheoretical and motivational interviewing models portends their useful integration in the service of health-behavior change in the cardiac rehabilitation setting. Based on the assumption that change is the responsibility of the individual, both models presume the necessity of collaboration to meet and support individuals wherever they are within the change process. Acceding the necessity of respect for an individual's readiness, the motivational interviewing model promotes the motivation that is necessary for individuals to navigate through the stages delineated by the Transtheoretical Model. Based on the recognition that ambivalence naturally attends the behavior change process, the Transtheoretical and Motivational Interviewing models provide a particularly useful framework for supporting change with cardiac rehabilitation patients who are facing serious health issues. Further, it is a framework particularly useful with individuals in the identified patient population whose social desirability bias likely predisposes them to relatively heightened resistance.

Chapter 4: Program Design and Procedures

The Heart to Heart program is a tele-health follow-up program designed to attend to the problem of noncompliance in the process of health-behavior change after formal outpatient cardiac rehabilitation treatment at a southern New Hampshire community hospital. Its conceptualization and development is based on the literature concerning the barriers to compliance in the secondary prevention of coronary heart disease in general and those relevant to the local population. Specifically, it is based on data and theory indicating the utility of and necessity for follow-up intervention beyond current standard-of-care outpatient cardiac rehabilitation to facilitate and maintain lifestyle behavior change that reduces morbidity and mortality in individuals with coronary heart disease. Additionally, program development is based on research undertaken at the identified CR site (Doherty, 2002). It takes into consideration the experience of nursing, exercise physiology and clinical psychology staff that constitutes the existing cardiac rehabilitation treatment team, including my personal observations as a member of that team over a two year period. The RE-AIM framework (Klesges et al., 2005) provided general guidelines to facilitate the internal and external validity of the program. Within that, ongoing formative evaluation guided program development. In addition, the proposed plan for summative evaluation follows guidelines specific to contemporary CR program evaluation (AACPR, 2004) identifying the necessity of outcomes assessment in health, clinical, behavioral and service domains.

The Heart-to-Heart Follow-up Program

The proposed Heart-to-Heart follow-up program is designed to be seamlessly integrated with the identified cardiac rehabilitation program (henceforth known as the anchor program). Therefore, the target population of the proposed aftercare program consists of those individuals

who complete this six-week comprehensive outpatient program. The anchor program is a Phase II (outpatient) cardiac rehabilitation program that utilizes an interdisciplinary team approach. Team members include staff cardiologists, cardiac nurses, an exercise physiologist, psychologists and doctoral psychology students. Eighteen two-hour rehabilitation sessions over a six-week period include an hour of monitored exercise therapy and an hour of psychoeducational topics facilitated in a group setting. The educational component encompasses topics such as CHD risk factors, diet and exercise, management and adjustment to medical procedures and stress management. One one-hour session each week includes a process-oriented support group facilitated by psychology staff including and encompasses education and behavior change for the management of risk factors.

Consistent with the anchor program, the proposed aftercare program aims to achieve significant and sustained changes in risk-factor related lifestyle behavior areas including stress management, diet, exercise habits and tobacco use in patients who have completed standard outpatient cardiac rehabilitation treatment. The literature clearly indicates that successful modification of risk-factor lifestyle behaviors in patients with coronary heart disease positively impacts proximal targets such as hypertension, emotional distress, hypercholesterolemia, and quality of life that also have an intermediary effect on distal targets including mortality and morbidity. Notably, outcomes tracked by clinical staff at the identified anchor program site show improvement in intermediary targets encompassing clinical categories including decreased body mass, improved blood lipid profiles, decreased blood pressure, decreased smoking and improved exercise capacity as well as documented evidence of decreased emotional distress and increased quality of life (Doherty, 2002). Hence, the goals of the proposed aftercare program are meant to be contiguous with those of the anchor CR program in promoting and maintaining

lifestyle behavior changes to thereby facilitate positive clinical outcomes. While economic considerations have recently altered the psychosocial component of the anchor CR program significantly, the proposed follow-up program was developed as it dovetailed with the heretofore longstanding structure. Therefore, the proposed aftercare program description is offered in the spirit of anticipation that the previous structure of the anchor CR program will abide. However, because the components of the proposed program stand alone as fundamental interventions for the lifestyle behavior change process, it is probable that, even with adaptations, it provides a useful structure with which to attend to the issues of compliance in CR treatment in this specific population.

The Heart to Heart program provides two interrelated components essential to the secondary prevention of CHD; direct lifestyle behavior change intervention and a liaison function between the program participants and varied healthcare providers. The lifestyle behavior change component consists of an initial interview, tele-health sessions that span the year following discharge from CR, and a discharge interview from the follow-up program. The Plan for Behavior Change (see appendix A) provides a tangible structure for and documentation of the lifestyle behavior change component. The liaison component consists of the process of the clinician providing a conduit for necessary communication within the multidisciplinary CR team.

Consistent with the literature, telephone contact is the vehicle for engagement between the CR patient and psychology doctoral students who are members of the outpatient cardiac rehabilitation team for a year following discharge from the CR program. A schedule of telephone contact based on cardiac rehabilitation health-behavior change research (Aldana et al., 2003; Giannuzzi et al., 2008; Lear et al., 2003; Lear et al., 2006; Lisspers et al., 2005; Ornish, 1998; Ornish et al., 1990, 1998; Quinn, Alderman, Facc, McWilliam, & Haskell, 1994; Wallner

et al., 1999) as well as CR staff input consists of weekly contact during the first 2 months, bi-weekly contact months 3 and 4, and monthly contact for 8 months. More frequent contact is made available for individual patients as the patient-clinician dyad deems necessary. The length of each contact is generally from 15-20 minutes with longer sessions being made available when the patient and therapist decide together that it would be most useful. Previous experience with this patient group indicates that most patients willingly engage in telephone sessions that fall within this time range. Patients who regularly require sessions beyond 30 minutes and may require more intensive intervention can be evaluated and referred for additional support services such as psychotherapy in addition to the follow-up behavior-change format.

The aftercare program commences with an individual thirty to forty-five minute session with psychology staff near completion of the anchor CR program. This interview, which takes place on-site at the anchor program, has the dual purpose of assessing the behavior change process as it has progressed during the formal CR program and of providing a bridge to the proposed aftercare program. The Plan for Behavior Change (see Appendix A) is a tool that both guides and documents the change process and becomes a “living document” that provides tangible scaffolding for the proposed program. Because psychology staff initializes this plan for each patient at commencement of the anchor CR program, review of the plan provides an important segue to the proposed after-care process. Revision of the plan promotes maintenance of achieved behavior changes and generates goals and strategies for new changes. In accordance with cardiac rehabilitation clinical practice guidelines (United States Department of Health and Human Services, 1995) indicating the necessity and clinical utility of simultaneous multifactor lifestyle behavior change, the clinician facilitating the initial follow-up program session reviews all of the individual participant’s relevant health-risk-behaviors including smoking, diet,

exercise, medication compliance and stress management to date. In line with recommendations that cardiac rehabilitation treatment involve medical recommendations while also being individualized, the clinician utilizes the Transtheoretical Model of behavior change (TTM) to assess the individual participant's readiness to change in each of the lifestyle areas. Utilizing the general principles of motivational interviewing (MI) including the expression of empathy through reflective listening, the development of discrepancy between the individual's goals and current problem behavior, rolling with resistance to change, and supporting self-efficacy, the clinician facilitates the participant's identification of behavior changes that he wishes to maintain, as well as those he would like to work toward changing after discharge from the CR program. A plan for behavior change is established for each specific behavior identified by the participant. The plan identifies specific necessary behavior changes, the individual's reasons for making change, and both short- and long-term behavior change goals. It also describes specific actions that will facilitate change and pinpoints potential barriers to making such changes. In addition, this process includes identification of individuals and groups that can provide necessary social support to make the change. The Behavior Change Plan, then, is a document that provides scaffolding that both structures and allows for the fluidity of the change process.

Contiguous with the anchor cardiac rehabilitation program, Heart to Heart utilizes the Transtheoretical Model of behavior change (TTM) as it dovetails with the motivational interviewing (MI) style to accurately identify the patient's stage of change for particular behaviors and tailor interventions to develop discrepancy, minimize resistance, resolve ambivalence and potentiate behavior change. The plan for behavior change constitutes a kind of corporeal container for the change process, providing a tangible structure that bridges each intervention. As patients move through the change process, the achievement of short-term goals

allows for space and energy to identify and work with new behavior change goals while also supporting the maintenance of changes that have already crystallized. The therapist utilizes the Plan for Behavior Change document to track each patient's goals for change, assess how they are managing obstacles disruptive to the change process, and to identify new change goals. Because the change process can be conceptualized as a kind of journey that often involves repeated cycles of abstinence and relapse (Orleans, 2000), the Plan for Behavior Change provides a structure that allows touching back into earlier behavior change goals and plans as needed throughout the program while also supporting the identification and promotion of new change goals.

Patient feedback about the intervention process is an essential component of the behavior change process in this program. While it is often utilized to provide post-intervention evaluation, ample evidence that immediate feedback from patient to therapist enhances both efficiency of and compliance with the psychotherapy process (Lambert et al., 2001; Slade, Lambert, Harmon, Smart, & Bailey, 2008) suggests that it also has an important intervention effect. While the mechanism of change is unclear, the fact that psychotherapy clients whose therapists receive their immediate feedback after each session attend more sessions suggests that it is a particularly useful intervention in a program that aims to promote patient compliance. Consequently, a brief assessment of the patient's experience of each telephone meeting serves to guide the therapist in planning future meetings that are responsive to the individual needs of each patient. This assessment encompasses three questions: How do you feel that our session went for you today? How might it have been better for you? What can we do to make our next session most useful to you? In line with the methods of Motivational Interviewing, these open-ended questions invite the patient to explore the immediate experience of the process while the therapist has the opportunity to briefly reflect on what the patient is experiencing, and affirm the value and

importance of that experience by inviting the patient's input to identify useful strategies. This discussion provides punctuation for the current session as well as an important segue into the next wherein the therapist offers a brief and succinct summary of the previous session assessment. For example, the therapist might begin the subsequent session with: "At the end of our last session, you expressed concern that I did not understand how difficult it is for you to manage your eating in the evening? How was that process for you this week?" The patient's evaluation of each telephone session, then, allows outcome assessment and planning based on each session while also promoting the patient's compliance with the intervention thereby enhancing the behavior change process as a whole.

The final session of the proposed program constitutes the discharge planning component. Like the initial session of the aftercare program, this session is generally 30 to 45 minutes in length and is scheduled accordingly. Providing a sort of bookend for the aftercare process, the clinician utilizes previous Plan for Behavior Change documents to review the changes that have occurred in each area including exercise, diet, smoking, and stress management. Consistent with the formulation that the change process is a dynamic one that likely involves repeated cycles of abstinence and relapse, the final session allows the patient and clinician to focus in on changes that are still in the offing as well as to anticipate those achieved changes that are most likely to be vulnerable to relapse. For example, a patient who has been successful at significantly decreasing fat and simple carbohydrates from his diet has the opportunity to consider what the triggers for relapse may be and identify strategies that will be useful beyond aftercare treatment to avoid those triggers. In addition, because relapse is often a part of the change process, strategies for managing relapse itself are identified including the identification of not only specific actions that were helpful in making the change initially but also those barriers that were

most difficult. Importantly, the identification of others who have been and are likely to be supportive of the change process is particularly important during the discharge session. Copies of Plan for Behavior Change documents for current behavior change goals as well as those pertaining to changes that may be most vulnerable to relapse are made available to patients after the final aftercare program session.

The liaison component of the Heart to Heart program provides a second essential function to promote compliance in the cardiac rehabilitation population. Effective communication between members of the multidisciplinary cardiac rehabilitation team mediates patient compliance at the patient, provider and systemic level (Miller, Hill, Kottke, & Ockene, 1997). The prevalence of multiple comorbidities that lead to complex treatment regimens as well as the patient's relationship with health care providers are factors that mediate compliance at all of these levels (Ockene, Hayman, Pasternak, Schron, & Dunbar-Jacob, (2002). In this particular group of patients who may be particularly resistant to acknowledging the seriousness of their symptoms and reticent to access support, communication between members of the team is particularly important to promote ongoing accurate assessment, provide necessary treatment changes, and provide consistent and unified support for the behavior change process across disciplines. Consequently, psychology staff members who facilitate the aftercare program provide an important link in the chain of communication between the patient and other members of the cardiac rehabilitation team.

Like many aspects of the Heart-to-Heart aftercare program, the liaison component evolved relatively organically. Formal communication during weekly team meetings combined with informal interactions occurring on the CR unit enabled the development of useful patterns of communication between psychology staff and other members of the CR team. Structurally,

the case-management function provided by on-site staff during the formal outpatient CR program conferred direction to the flow of communication for the aftercare program as well. Questions and concerns pertaining to medical aspects of the behavior-change process for each patient are directly reviewed with the on-site CR staff that actively participates in strategizing and directing necessary action. Further, predictable contact between psychology staff and aftercare patients enables a window into treatment issues that might not come to the attention of medical staff otherwise. The liaison role allows psychology staff to relate these issues to the CR staff who can then respond directly or make necessary referrals within the medical team.

The Heart to Heart aftercare program is meant to dovetail as seamlessly as possible with the on-site formal CR program at the identified site. Based on an understanding of behavior change as an ongoing dynamic process that encompasses repeated cycles of relapse, the program provides a structure to contain this process through and beyond the time that relapse typically ensues. Utilization of the Plan for Behavior Change as a guide and living document enables a kind of scaffolding around which the principles of the Transtheoretical Model of Change interact with the Motivational Interviewing style to support ongoing lifestyle behavior change as it encompasses the problem of compliance after discharge from formal outpatient cardiac rehabilitation.

Program Evaluation

The RE-AIM dimension of Efficacy, or the impact of program interventions on important outcomes, points to the need for outcome assessment in developing a healthcare program that is effective and generalizable. Outcome research, the process of determining whether a treatment works, is a standard that guides assessment of the quality of care in medical, psychology and health psychology fields. Within the arena of cardiac rehabilitation, outcomes

are recognized as leading indicators of the quality of care and are applied to clinical decision making as well as policy development (Pashow et al., 1995). To that end, a model specific to the services provided by contemporary CR programs provides a framework for evaluating the proposed aftercare program (AACVPR, 2004). Research guidelines provided by the American Association of Cardiovascular and Pulmonary Rehabilitation Outcomes Committee (AACVPR) recommend outcomes assessment within each of four areas including Health, Clinical, Behavioral and Service domains. Further, they describe the complexity that attends the interaction of health, clinical and behavioral domains in CR treatment. Simply put, health-related behaviors targeted by CR programs such as diet and stress management influence clinical outcomes such as weight and psychological health that in turn impact important primary health outcomes such as morbidity and quality of life. Indeed, a comprehensive system of outcomes assessment of the identified anchor CR program reveals a picture that is consistent with these trends. Improvements in medically-related clinical outcomes such as blood pressure, weight, blood lipid levels and psychological distress correlate with improvements in primary health domains as well (Doherty, 2002). Extensive and ongoing evaluative efforts of the anchor program, then, naturally provide the scaffolding for outcomes assessment of the proposed aftercare program in the health and clinical domains. Evaluation of the proposed program derives from and elaborates upon these efforts, employing the same measures of psychological distress and health-related quality of life. In doing so, the proposed evaluation process promotes efficiency and provides evaluative data within the clinical and health domains that is consistent between the two programs. The addition of questionnaires to assess patients' self-reported behaviors, efficacy and knowledge extends evaluation within the aftercare program to include the behavioral domain. Finally, incidence of program completion and a patient satisfaction

questionnaire augment formative evaluative input from CR staff to complete assessment within the service domain.

The outcomes assessment strategy employed by the anchor CR program establishes a foundation for the evaluation of the proposed aftercare program in the health and clinical domains. According to AACVPR guidelines (Pashkow et al. 1995), the health domain encompasses primary indicators of health outcomes that include morbidity, mortality and quality of life. While the measurement of morbidity and mortality is generally beyond the scope of individual program evaluation, quality of life is a critical gauge of cardiac rehabilitation intervention. Based on the patient's perception of personal well-being and general satisfaction with life, quality of life is a major focus of cardiac rehabilitation clinicians and practitioners. In line with industry standards as well as the outcomes strategy of the anchor program, evaluation of the proposed aftercare program utilizes the Short Form 36 Health Survey (SF-36; Ware, Snow, Kosinski, & Gandek, 1993) to assess physical, psychological and social functioning often associated with quality of life. The clinical domain, a second area important to program evaluation, encompasses physiological, psychosocial and medical utilization indices such as blood pressure, medication levels, hospitalization visits, and psychological status. Established outcomes assessment strategy in the anchor program illustrates the clinical wisdom of a focus on psychological symptoms, clinical factors that predict morbidity and mortality in CHD patients (Frasure-Smith, Lesperance, & Talajic, 1993). Utilization of the Brief Symptom Inventory (BSI, Derogatis, 1993), and the Beck Depression Inventory for Primary Care (BDI-PC, Beck, Steer, Ball, Ciervo, & Kabat, 1997) to assess the outcomes of the proposed aftercare program dovetails with these previous efforts, building on research that complements the assessment of multiple medical indices routinely performed within the anchor CR program.

In addition to statistical significance analysis, Clinical significance theory (Jacobsen & Truax, 1991; Jacobson, Roberts, Berns, & McGlinchey, 1999) provides essential scaffolding to the outcomes assessment strategy for the health and clinical domains of the proposed program. In response to the limitations of statistical significance tests in evaluating psychotherapy treatment efficacy, clinical significance is offered as a standard of change that attends to within-treatment variability of response to and efficacy of a particular treatment. Because conventional statistical research is limited to comparing groups of treated patients, it does not reflect variability of treatment response from person to person. For example, it does not indicate the proportion of individuals who have improved or recovered as a function of the treatment. Further, group comparisons do not provide evidence of clinically meaningful or relevant change. Clinical significance characterizes practically meaningful change or “recovery” as a magnitude of change that is reliable and crosses an identified cutoff point into a healthier norm range. Consequently, it constitutes a standard that is applicable to the project of assessing the utility of cardiac rehabilitation aftercare interventions aimed at achieving the overall goals of cardiac rehabilitation; promoting and maintaining levels of physical, psychological and social functioning that equal or exceed pre-morbid levels (Leon et al., 2005).

Generally, clinically significant change is determined by using a two-step method developed by Jacobson and Truax (1991). Change is considered clinically useful if it is reliable or of a magnitude that is unlikely to be the product of measurement error, and if it crosses a cutoff point that identifies a healthier norm range. Reliable change is calculated individually for each patient using a reliable change index (RCI) that is calculated for each measure. This score is based on the difference between pre and post treatment scores divided by the standard error of difference (derived from the standard error of measurement reported for the specific measure)

between the two scores. A Reliable Change Index greater than 1.96 reflects real change that is unlikely to be reflective of fluctuations of an imprecise measuring instrument. Within the proposed program evaluation process, a patient is considered “recovered” when their change score is reliable and crosses an established cutoff point into a population range indistinguishable from well-functioning people (Jacobson et al., 1999). A patient is considered “deteriorated” if his change score is reliable and downgraded to a lower level of functioning. Finally, patients whose reliable change scores improve but do not cross into a different range of functioning are considered “improved.” Examination of clinically significant change in the measurement of quality of life and psychological distress is proposed in addition to statistical significance of pre and post measure scores to assess outcomes of the proposed aftercare program in the health and clinical domains.

The proposed program evaluation utilizes the Study Short Form 36 Health Survey (SF-36; Ware, Snow, Kosinski, & Gandek, 1993) to measure health related quality of life, an indicator of outcomes within the Health domain. Its use at commencement and completion of the anchor program provides a long view of CR program efficacy. Its use at completion of the anchor program serves the dual function of marking quality of life at commencement of the aftercare program. The SF-36 is a widely used instrument utilized within the cardiac rehabilitation population (Pashkow et al., 1995), and accesses the patient’s perception of the ability to perform daily tasks. The test-retest reliability of this measure is .76 for primary care patients (Wetzler, Lum, & Bush, 2000). The SF-36 includes 8 subscales including physical functioning (PF), social functioning (SF), bodily pain (BP), mental health (MH), vitality (VT), role limitations due to emotion (RE) role limitations due to physical problems (RF), and general health perceptions (HP). The Mental Health Component Summary (MCS) and the Physical

Component Summary (PCS) are two summary scales that define distinct physical and mental health clusters and account for 80-85% of the variance in the eight subscales. These MCS and PCS scales are utilized to assess quality of life in the proposed program evaluation.

The Brief Symptom Inventory (BSI, Derogatis, 1993) and the Beck Depression Inventory-Primary Care (BDI-PC, Beck, Steer, Ball, Ciervo, & Kabat, 1997) are the measures to be utilized for program evaluation within the Clinical domain. Both measures of psychological functioning, they assess information about psychological health, an essential index of outcomes within this domain as recommended by the AACVP (1991). The Brief Symptom Inventory (Derogatis, 1993) is a short version of the Symptom Checklist (SCL) 90. It is a 53-item self-report measure that assesses psychological symptoms. Scores are derived for nine dimensions including Somatization (SOM), Obsessive-Compulsive (O-C), Interpersonal Sensitivity (I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR) and Psychoticism (PSY), with three global indices of distress including the Global Severity Index (GSI), the Positive Symptom total (PST) and the Positive Distress Index (PSDI). The test-retest reliability of the nine Symptom Dimension scales and the Global Indices ranges from .68 to .91. The Beck Depression Inventory for Primary Care (BDI-PC, Beck, Steer, Ball, Ciervo, & Kabat, 1997) is a 7-item version of the Beck Depression Inventory-II. It specifically measures the cognitive and affective symptoms of depressed patients in medical patients and has a test-retest reliability of .82.

Evaluation of outcomes within the Health and Clinical domains encompasses analysis for statistical significance and for clinically significant change. Traditional testing of statistical significance, or reliability of results beyond chance or measurement error, utilizes a pre-post design with normative and reflexive controls. The aftercare program patients serve as reflexive

controls with comparison of their functional status at entry and graduation from the program.

The pre and post scores of the three self-report measures will be analyzed for statistical significance using dependent samples *t*-tests. Clinical cut-off scores, as determined in the manuals of each test, will be used to place patients within functional groups and pre-post changes in this membership status will be analyzed using chi-square analysis.

The evaluation of clinical significance for results of the three measures will encompass the two-step process described by Jacobson & Truax (1991). Reliable change will be calculated for each individual patient using a reliable change index (RCI) based on the difference between pre and post treatment scores divided by the standard error of difference between the two scores ($RCI = \frac{X_2 - X_1}{S_{diff}}$, where X_1 the individual patient's pretest score and X_2 represents the post test score). Reliable scores will then be located in either "recovered," "deteriorated" or "improved" groups as described earlier in this section.

Behavioral outcomes have received relatively little attention in cardiac rehabilitation program evaluation likely because they are perceived as being more difficult to measure in a standardized way. Limitations of measures available to assess behavioral change include their length, the difficulty and expense of analysis and lack of standardization on the CR population. The AACVPR Statement on Measuring Behavioral Outcomes in Cardiopulmonary Rehabilitation (Verrill et al., 2009) identifies five specific outcomes that define a level of success in behavioral modification because they are significant to health and well-being, universally addressed in CR programs, and lend themselves to objective measurement. These outcomes include smoking cessation, medication adherence, adherence to supplemental oxygen use, exercise habits and nutritional habits. The infrequent use of supplemental oxygen within the population of the proposed program precludes the necessity of measuring this outcome.

Medication adherence, on the other hand, would typically constitute an important arena for outcome measurement in a cardiac rehabilitation aftercare program. However, because the formative evaluation process with the interdisciplinary team of the anchor program precluded medication adherence as a focus of the aftercare process, it is not included in the outcomes assessment plan. Therefore, evaluation of the proposed aftercare program includes the assessment of smoking cessation, exercise habits and nutritional habits.

Individuals who participate in Cardiac Rehabilitation programs often have a history of exposure to environmental tobacco use. Notably, the goal of CR treatment is for each participant to have no exposure to environmental smoke in any instance (Verrill et al., 2009). Therefore, accurate assessment of efficacy of strategies in this arena requires assessment of direct and indirect exposure to tobacco products. Because smoking relapse most often occurs within the first year after cessation, accurate classification of current as well as past smokers is necessary to clarify readiness to change and identify functional groups for evaluation of treatment. Treating and evaluating behavior change in this arena of the Behavioral domain is aided by classifying “current” smokers as individuals who currently use tobacco or have used it within the past 12 months (Verrill et al., 2009). Likewise, “former” smokers are those individuals who have not used tobacco within the past 12 months. The success of tobacco avoidance strategies, then, can be characterized by comparing the percentage of former or current tobacco users at program entry with that of patients who have completed the aftercare program. Outcomes assessment of smoking cessation strategies in the proposed aftercare program include asking the patient three questions: How many days each week are you currently smoking or using smokeless tobacco? How many cigarettes, pipes of tobacco, cigars or dips of smokeless tobacco do you currently smoke or use each day? How many times each week are you exposed to secondhand tobacco

smoke at home, at work, or in your social settings? The percentage change in tobacco exposure for each patient will be calculated by obtaining the change score between program entry and graduation and dividing that by the pre-treatment score.

Determining adherence to prescribed exercise goals in CR patients requires a quantification of exercise variables including duration minutes/day), frequency (days/week) and intensity (low, moderate or high exertion level) (Verrill et al. 2009). While there are no questionnaires measuring physical exercise adherence that are validated specifically for CR patients, the International Physical Activity Questionnaire-Short Form (IPAQ-short) is a widely used self-report instrument that measures each of these variables (IPAQ, 2005). Validated on a number of populations, the IPAQ-short assesses physical activity across a wide set of domains including leisure time activity, domestic and gardening activities, work-related physical activity and transport-related activity across three levels of exertion over a week's time. Computation of the total score for this form requires summation of the duration in minutes and frequency (days) of activities classified as either walking (low intensity), moderate or vigorous as determined in the scoring manual (IPAQ, 2005). The volume of activity is then computed by weighting each type of activity by its energy requirements defined in METs defined for each level of intensity (multiples of the resting metabolic rate) to yield a score in MET-minutes. Individual patient percentage change scores will then be calculated by obtaining a percentage score of the difference between the program entry and graduation scores divided by the program entry score and multiplied by 100.

The MEDFACTS dietary questionnaire is a tool used to assess adherence to the American Heart Association dietary fat intake guidelines (Kris-Etherton et al., 2001). Developed in response to the impediments of time and expense that attend clinical assessment tools previously

focused on precise measurement of nutrient intake, the MEDFICTS is a simple tool that quickly identifies an individual's distribution or pattern of fat intake. Validated as a measure of dietary fat intake with a number of populations at risk for coronary heart disease, evidence of the correlation between MEDFICTS scores and clinically relevant measures of total cholesterol, triglycerides, and waist circumference in CR patients (Holmes, Sanderson, Maisiak, Brown, & Bittner, 2005) makes it an excellent candidate for the assessment of behavioral outcomes in the proposed program. It is a self-administered questionnaire that can be completed by the patient within 3-5 minutes and is easily scored by the health-care provider. The MEDFICTS identifies weekly consumption of desirable and undesirable food items based upon total fat content in 8 food categories: *Meats, Eggs, Dairy, Fried foods, fat In baked goods, Convenience foods, fats added at the Table and Snacks*. Numeric values are assigned to each food group with weightings based upon weekly consumption and serving size. The questionnaire is scored by totaling the quality-adjusted intake quantity yielding a possible range of scores from 0 to 216 points. Lower scores indicate diets containing less dietary fat with a cut-off score of 70 and above indicating a high fat diet. In line with the AACVPR recommendations for behavioral outcome measurement, comparison of individual and group pre- and post-treatment scores will provide a picture of how the aftercare program impacts change within the area of dietary habits.

Evaluation in the service domain attends to factors outside of the clinical, health and behavioral domains. In the proposed program, the satisfaction of both patients and CR team members is fundamental to both program structure and quality. Formative evaluation was built into both the evolution and delivery of the aftercare program in the service domain. The organic nature of this program's development encompassed ongoing input from CR team members including the anchor program managers (nursing and exercise physiology staff) as well as the

consulting psychologist and psychology doctoral students. This process allowed ongoing evaluation of many aspects of the program by team members who often interfaced with the patients before, during and after the follow-up program. In addition, evaluation of patient satisfaction was an integral aspect of the program itself. Because patient feedback at the conclusion of each telephone session was an integral aspect of the intervention process, formative evaluation of the program was ongoing at the individual level. In addition to the formative evaluative process in the service domain, the proposed plan for program evaluation also includes a patient-satisfaction survey at the conclusion of the program. In addition, a survey of those individuals involved in the CR team including CR staff, as well as ancillary health care providers is intended to assure overall quality as well as build support for the program among various stakeholders.

The proposed plan for program evaluation of the Heart to Heart aftercare is an effort to evaluate the effectiveness of a tele-health follow-up aftercare program for an established cardiac rehabilitation program in a southern New Hampshire hospital. Because the aftercare program was designed to dovetail as seamlessly as possible with the anchor program, the evaluation process is meant to provide a picture that is comprehensive and continuous. The evaluation plan attends to the overall question of the effectiveness and generalizability of a healthcare program as outlined by the RE-AIM framework (Klesges, Estabrooks, Dzewaltowski, Bull, & Glasgow, 2005). Further, it complies with program evaluation guidelines within the field of Cardiac Rehabilitation (AACVPR, 2004). Clinical significance is assessed in Health and Clinical domains to ascertain the program's effectiveness at promoting positive change and preventing relapse. Importantly, a plan for the assessment of the often ignored behavioral outcomes provides a basic structure for identifying trends in an area that has thus far received little

attention within the CR field. While the proposed assessment of behavioral outcomes is a relatively uncomplicated process, it hopefully lays the groundwork for developing more vigorous outcomes assessment within a domain that is so essential to the secondary prevention of coronary heart disease. Finally, assessment within the Service domain, while enveloped within the development and application of the proposed program, is also provided in an effort to gather information from stakeholders after the program is completed.

Discussion

How do we help people change their behavior when their lives depend upon it? Through a wide lens, the development of the proposed program attempts to answer this question. In retrospect, it has been an exercise in holding the dialectical relationship between simplicity and complexity. Physiologically, Coronary Heart Disease is a highly complex phenomenon that has a prodigious impact at so many levels. However, it is a disease process that is remarkably amenable to the impact of individual behavior. It is almost unbelievable that a problem of such complexity and consequence could have such a simple solution. The simplicity of it is truly elegant. And yet, the complexity of human behavior belies this simplicity creating a dialectical tension that is relevant to understanding the development and the treatment of CHD.

The tension between simplicity and complexity attendant to the pathophysiology of CHD is mirrored in the development and implementation of the proposed program. The fundamental element of the program is really quite simple; increased frequency and duration of collaborative contact between the provider and the individual patient. Attributes particular to the specific anchor program contributed to the ease with which the conceptualization and initial implementation came about. And yet, the facilitation of a seemingly straightforward plan is complicated in ways that present important potential barriers at both systemic and individual

levels. Learning Theory research, theories of behavior change and research specific to the secondary prevention of CHD clearly support the utility of frequent ongoing contact in successfully managing this disease. The extensive groundwork developed throughout the history of the collaboration between the doctoral program clinic staff and the outpatient anchor program provided clear vision in regard to necessary and useful programming elements. Finally, the enthusiastic support and involvement of the anchor program treatment team members contributed to an ease in the development and implementation of the proposed aftercare program that does not always attend this kind of work. However, as is often the case, the complexity of human behavior becomes an essential piece of the dialogue that attends this process, and presents potential barriers to smooth implementation.

An important potential barrier to the implementation of this program is illustrative of the complexity that attends a seemingly simple program. The provision of telephone contact that constitutes the overarching structure of the program is a relatively uncomplicated process and provides a service in a way that is particularly useful to a local patient population whose ambivalence is likely to impede their ability to access treatment. Likewise, it provides a multifaceted and rich learning opportunity for doctoral graduate students. Having said that, it seems important to recognize that, in this case, a simple phone call is not simple at all. The nature of the behavior change process is complicated and the collaboration necessary for successful intervention is not easily won. The accurate assessment of stages of behavior change necessary for intervention planning requires important knowledge and skill. Likewise, the process of utilizing Motivational Interviewing principles and practices to engage skillfully and to facilitate relatively complex interventions within limited time is challenging. Therefore, a relative lack of experience and training in this specific arena is likely to be an impediment to

successful implementation of the program. Consequently, it would seem helpful to consider frontloading training opportunities specific to these two skill sets.

The simplicity of the structure of this program lends itself to relatively uncomplicated implementation, particularly as it relates to the collaboration of the doctoral training site staff and the CR treatment team. It requires limited man power, utilizes existing services and therefore does not have substantially increased overhead cost, and allows scheduling flexibility. However, the complicated nature of financial issues as they relate to multiple sub-systems of medical care presents another important barrier to implementation of the Heart to Heart program. Financial issues have relatively recently impacted the structure of the collaboration between the anchor program and consulting psychologist providers to the extent that implementing this program would, at the very least, require more effort and financial problem-solving. Given the very recent political and economic climate in this country, the ambiguity surrounding the financial aspects of health-care delivery constitutes a very real threat to existing programs, portending an even more dismal picture in the case of adjunct programs such as this one.

The fundamental element of the Heart to Heart program seems a simple one. The probability that increased frequency and duration of patient-provider contact over the telephone is likely to have substantial positive impact on a disease process that has such serious and far reaching manifestations is heartening. However, as is always the case, the complexity that underlies the simple structure of this program is essential to its value. Financial considerations necessary for adequate training of graduate student providers in conjunction with the very murky financial concerns within the health-care system of this country would make the implementation of this program very difficult at this time. Having said that, it is an exciting arena within which

to practice psychology and it has been a rich and fascinating training experience while also providing a service that is necessary and useful.

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Appendix A

Plan for Behavior Change

The most important change I want to make right now is:

The most important reason I want to make this change is:

My long term goal for myself in making this change is:

My short term goal for making this change in the next 4-6 weeks is:

I will do these things to make the change: When:

Other people could help me with change in these ways:

Person who might help: Possible ways they can help:

What might get in the way of making this change:

Barrier to change: Possible ways to respond to this barrier: