PREDICTORS OF PERCEIVED DIET SELF-EFFICACY
IN PATIENTS WITH HEART FAILURE

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by

Nancy M. Albert

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Dissertation written by

Nancy M. Albert

B.S.N., Cleveland State University, 1985

M.S.N., Kent State University, 1991

Ph.D, Kent State University, 2005

Approved by

_________________________, Co-Chair, Doctoral Dissertation Committee

_________________________, Co-Chair, Doctoral Dissertation Committee

_________________________, Members, Doctoral Dissertation Committee

Accepted by

_________________________, Director, Joint Ph.D in Nursing Program

_________________________, Dean, College of Nursing
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>ix</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>x</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>I INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Significance of the Problem and Impact on Nursing</td>
<td>2</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>4</td>
</tr>
<tr>
<td>Theoretical Framework</td>
<td>5</td>
</tr>
<tr>
<td>Stimuli That Construct an Illness Representation</td>
<td>5</td>
</tr>
<tr>
<td>Illness Threat</td>
<td>6</td>
</tr>
<tr>
<td>Common Sense Model Principles</td>
<td>7</td>
</tr>
<tr>
<td>Illness representation attributes</td>
<td>8</td>
</tr>
<tr>
<td>Coping behaviors</td>
<td>9</td>
</tr>
<tr>
<td>Appraisal</td>
<td>9</td>
</tr>
<tr>
<td>Operational Definitions of the Common Sense Model of Illness</td>
<td>10</td>
</tr>
<tr>
<td>Heart Failure (HF) Representation as an Illness Threat</td>
<td>10</td>
</tr>
<tr>
<td>The Emotional Response of HF as an Illness Threat</td>
<td>11</td>
</tr>
<tr>
<td>Variables</td>
<td>15</td>
</tr>
<tr>
<td>Hypotheses and Rationale</td>
<td>16</td>
</tr>
<tr>
<td>II REVIEW OF THE LITERATURE</td>
<td>23</td>
</tr>
<tr>
<td>Importance of Low Sodium Diet in the Treatment Plan</td>
<td>23</td>
</tr>
<tr>
<td>Self-Efficacy and Self-Efficacy Promotion of Behavior</td>
<td>25</td>
</tr>
<tr>
<td>Relating Self-Efficacy and the Common Sense Model of Illness</td>
<td>26</td>
</tr>
<tr>
<td>The Common Sense Model of Illness Representation</td>
<td>29</td>
</tr>
<tr>
<td>HF Representations: Background As Applied to This</td>
<td>29</td>
</tr>
<tr>
<td>Dissertation</td>
<td>30</td>
</tr>
<tr>
<td>Attributes of the model in this study</td>
<td>30</td>
</tr>
<tr>
<td>Relating illness representations to self-efficacy</td>
<td>32</td>
</tr>
<tr>
<td>Cognitive HF Threats That May Predict Self-Efficacy</td>
<td>34</td>
</tr>
<tr>
<td>Illness beliefs based on the accuracy of knowledge of HF</td>
<td>34</td>
</tr>
<tr>
<td>HF representation based on objective cues of HF severity</td>
<td>38</td>
</tr>
<tr>
<td>Depression as an Emotional Reaction to HF Threat and HF Representation</td>
<td>43</td>
</tr>
<tr>
<td>Depression, HF and cardiovascular disease</td>
<td>44</td>
</tr>
<tr>
<td>Depression and illness representation</td>
<td>46</td>
</tr>
</tbody>
</table>
### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Variables</td>
<td>48</td>
</tr>
<tr>
<td>Summary</td>
<td>51</td>
</tr>
<tr>
<td><strong>III. METHODS.</strong></td>
<td>54</td>
</tr>
<tr>
<td>Population</td>
<td>54</td>
</tr>
<tr>
<td>Sampling Criteria</td>
<td>55</td>
</tr>
<tr>
<td>Instruments</td>
<td>57</td>
</tr>
<tr>
<td>The Low Sodium Eating Behaviors Scale</td>
<td>59</td>
</tr>
<tr>
<td>Survey of Illness Beliefs in HF</td>
<td>60</td>
</tr>
<tr>
<td>Objective Cues of Severity</td>
<td>62</td>
</tr>
<tr>
<td>Activity scale</td>
<td>64</td>
</tr>
<tr>
<td>Nine Symptom Checklist</td>
<td>65</td>
</tr>
<tr>
<td>Control Variables</td>
<td>67</td>
</tr>
<tr>
<td>Demographic (Non-Control) Variables</td>
<td>68</td>
</tr>
<tr>
<td>Summary of Instruments and Forms</td>
<td>68</td>
</tr>
<tr>
<td>Data Collection Procedures</td>
<td>70</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>77</td>
</tr>
<tr>
<td>Human Subjects</td>
<td>83</td>
</tr>
<tr>
<td><strong>IV. RESULTS</strong></td>
<td>86</td>
</tr>
<tr>
<td>Participant Characteristics on Perceived Diet Self-Efficacy and</td>
<td>86</td>
</tr>
<tr>
<td>Predictor Variables</td>
<td>99</td>
</tr>
<tr>
<td>Predictors of Diet SE: Analyses of Hypotheses</td>
<td>99</td>
</tr>
<tr>
<td>Hypothesis 1: Patients Who Have Accurate HF Illness Beliefs</td>
<td>99</td>
</tr>
<tr>
<td>Have Strengthened Perceived Diet Self-Efficacy</td>
<td>99</td>
</tr>
<tr>
<td>Hypothesis 2: Patients With a Greater Number of Objective Cues of HF</td>
<td>100</td>
</tr>
<tr>
<td>Severity Have Strengthened Perceived Diet Self-Efficacy</td>
<td>100</td>
</tr>
<tr>
<td>Hypothesis 3: In Patients with Asymptomatic or Mild HF, Those With</td>
<td>101</td>
</tr>
<tr>
<td>Accurate HF Illness Beliefs will have Strengthened Perceived Diet Self-Efficacy Than Those with Inaccurate HF Illness Beliefs.</td>
<td>101</td>
</tr>
<tr>
<td>Hypothesis 4: Patients Who are Depressed Have Weakened Perceived Diet Self-Efficacy</td>
<td>101</td>
</tr>
<tr>
<td>Hypothesis 5: Accuracy of HF Illness Beliefs, Number of Objective Cues of HF Severity, and the Level of Depression Together Explain a Statistically Significant Amount of Variance for Diet Self-Efficacy</td>
<td>102</td>
</tr>
<tr>
<td>Hypothesis 6: The Relationships in Hypothesis 5 Hold When Controlling for Control Variables</td>
<td>105</td>
</tr>
<tr>
<td><strong>V. DISCUSSION</strong></td>
<td>115</td>
</tr>
<tr>
<td>Summary of Findings</td>
<td>117</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>1.</td>
<td>Common Sense Model of Illness Representation Model</td>
</tr>
<tr>
<td>2.</td>
<td>Common Sense Model of Illness Representation model in HF</td>
</tr>
<tr>
<td>3.</td>
<td>Hypothesized Model of Health Threat in HF</td>
</tr>
<tr>
<td>4.</td>
<td>Hypothesized Model of Illness Threat in HF with components of each variable</td>
</tr>
<tr>
<td>5.</td>
<td>Modified Consolidated Standards Of Reporting Trials (CONSORT) diagram of sample</td>
</tr>
<tr>
<td>6.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy</td>
</tr>
<tr>
<td>7.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Ability to Resist Relapse in Low Sodium Diet Self-Efficacy</td>
</tr>
<tr>
<td>8.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Ability to Reduce Salt in Low Sodium Diet Self-Efficacy</td>
</tr>
<tr>
<td>9.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Behavioral Skills in Low Sodium Diet Self-Efficacy</td>
</tr>
<tr>
<td>10.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy when Age Is Controlled</td>
</tr>
<tr>
<td>11.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy when Someone to Confide In is Controlled</td>
</tr>
<tr>
<td>12.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy when Medically Managed Diabetes Mellitus is Controlled</td>
</tr>
<tr>
<td>13.</td>
<td>Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Resisting Relapse for Low Sodium Diet Self Efficacy when Age is Controlled</td>
</tr>
<tr>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td></td>
</tr>
<tr>
<td>14. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Resisting Relapse for Low Sodium Diet Self Efficacy when Medically Managed Diabetes Mellitus is Controlled</td>
<td>111</td>
</tr>
<tr>
<td>J.1. Scree Plot</td>
<td>171</td>
</tr>
<tr>
<td>J.2. Histogram of “Holistic” HF Illness Beliefs Scores</td>
<td>172</td>
</tr>
<tr>
<td>J.3. Histogram of “Episodic” HF Illness Beliefs scores</td>
<td>173</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Demographic Variables</td>
<td>69</td>
</tr>
<tr>
<td>2.</td>
<td>Analysis Methods: Based on Research Hypotheses</td>
<td>79</td>
</tr>
<tr>
<td>3.</td>
<td>Confident in Carrying Out Low Sodium Diet Self-Efficacy by Age, Gender, and Race</td>
<td>87</td>
</tr>
<tr>
<td>4.</td>
<td>Confident in Carrying Out Low Sodium Diet Self-Efficacy by Education and SE Status</td>
<td>90</td>
</tr>
<tr>
<td>5.</td>
<td>HF Illness Beliefs by Age, Gender, and Race</td>
<td>91</td>
</tr>
<tr>
<td>6.</td>
<td>HF Illness Beliefs by Education, Marital Status, and Socioeconomic Status</td>
<td>93</td>
</tr>
<tr>
<td>7.</td>
<td>Objective Cues of HF by Age, Gender, and Race</td>
<td>94</td>
</tr>
<tr>
<td>8.</td>
<td>Objective Cues of HF by Education, Marital Status, and Socioeconomic Status</td>
<td>95</td>
</tr>
<tr>
<td>9.</td>
<td>Level of Depression by Age, Gender, and Race</td>
<td>97</td>
</tr>
<tr>
<td>10.</td>
<td>Level of Depression by Education, Marital Status, and Socioeconomic Status</td>
<td>98</td>
</tr>
<tr>
<td>11.</td>
<td>Perceived Diet Self Efficacy as Predicted by HF Illness Beliefs, Objective Cues of HF Severity, HF Illness Beliefs in Participants with Asymptomatic or Mild HF, and Depression</td>
<td>100</td>
</tr>
<tr>
<td>12.</td>
<td>Depression as a Predictor for Perceived Diet Self Efficacy, Using Control Variables</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Appendix J.1. Rotated Component Matrix</td>
<td>174</td>
</tr>
<tr>
<td></td>
<td>Appendix P. Bivariate (one-tailed) Correlations Among Study Variables Table</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Appendix Q Coefficient for Model (Independent Variables) Predicting Perceived Diet Self-Efficacy Table</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>Appendix R. t Values for Depression as a Predictor for Perceived Diet Self-Efficacy, Using Control Variables Table</td>
<td>190</td>
</tr>
</tbody>
</table>
Patients with heart failure (HF) are frequently hospitalized due to excessive sodium intake. A behavior promotion model, The Common Sense Model of Illness Representation, was used to determine predictors of self-efficacy for low sodium diet behaviors (Diet SE). When this model was used in non-HF illnesses, the level of threat imposed by implicit illness representation (knowledge about the meaning of an illness [illness beliefs] and symptoms of illness severity [objective cues]) prompted coping through self care behaviors. In addition to the direct threat imposed by an implicit representation, the emotional response to the representation prompted coping.

Hypotheses: In patients with HF, (1) accuracy of HF beliefs strengthens Diet SE; (2) greater number of objective HF cues strengthens Diet SE; (3) accuracy of HF beliefs strengthens Diet SE when HF is asymptomatic or mild; (4) depression lessens Diet SE; (5) a combination of HF beliefs, objective HF cues, and depression together predict Diet SE; and (6) when controlling for prespecified control variables, the relationships in hypothesis 5 hold.

In 219 patients, more were Caucasian, elderly, married, educated, and non-depressed. Overall, patients had inaccurate HF beliefs and mild objective cues of HF severity. Accurate HF beliefs (all patients and those with mild HF) and number of objective cues did not predict Diet SE (Hypothesis [Ho] 1, 2, and 3). Higher depression
predicted less strength in resisting relapse and total Diet SE (Ho 4). When combining predictor variables (Ho 5), the model predicted resisting relapse for Diet SE, but not reducing salt, behavioral skills, or total Diet SE. Age, someone to confide in, and diabetes were associated with Diet SE. After adjusting for these variables, the original combination model relationship with resisting relapse for Diet SE was lost due to the effect of someone to confide in but retained when age and diabetes were entered (Ho 6).

Since HF beliefs and cues of severity did not create enough threat to promote Diet SE, nurses must assess patient education protocols, especially if symptoms provide the rationale for self-care adherence. Assessment of depression is needed so that diagnosis and treatment are promoted.
Chapter I: Introduction

Left ventricular systolic dysfunction or heart failure (HF) is a major public health concern, leading to both death and disabilities. In 2000, approximately 262,300 deaths occurred, and this death rate represented an increase of 148% compared to 1979 (American Heart Association (AHA), 2002). This dramatic increase in mortality and the continued increase in incidence and prevalence is due to the aging of Americans and advances in the treatment of valve disease, coronary artery disease and hypertension (O’Connell, 2000; Starling, 1998). In the United States in 2000, 999,000 hospital discharges were assigned a primary diagnosis of HF and hospitalizations increased by 165% when compared to 1979 statistics (AHA). These hospitalizations cost Medicare beneficiaries 3.6 billion dollars in 2000 (AHA). Heart failure is a chronic, progressive, debilitating, and costly condition that warrants strategies to improve the lives of patients and their families.

One of the many therapies that limits progression and disabilities of HF is control of sodium intake. A stringent sodium diet of 2000 to 3000 milligrams per day is recommended (American College of Cardiology (ACC)/AHA Task Force, 2001). Low sodium diet adherence can decrease intravascular and interstitial volume. Adherence is the action of sticking to, supporting, or following a person or idea (Buchmann, 1997). A low sodium diet leads to less fluctuation in daily weight and decreases the need for fluid
restriction. Thus, self-care that includes adherence to low sodium diet behaviors promotes an improved quality of life and decreased morbidity (hospitalization).

Diet adherence can be difficult. When not followed, HF symptoms worsen and morbidity increases. Studies that assessed acute precipitants of HF exacerbation found that excessive sodium retention routinely ranked as the primary factor leading to hospitalization (Bennett et al., 1998; Joshi, Mohanan, Sengupta, & Salkar, 1999; Tsuyuki et al., 2001). The predominant precipitating factor for excessive sodium retention in many patients was lack of adherence to sodium restriction, leading to volume overload. Generally, sodium retention and volume overload are considered preventable causes of hospitalization in patients with pre-existing HF (Joshi et al). Sodium retention leads to hemodynamic changes, myocardial and endothelial dysfunction, abnormal redistribution of blood, and other end-organ damage. However, a negative sodium balance that could occur with proper low sodium diet adherence decreases activation of neuroendocrine hormones that worsen HF. Consequently, promotion of and adherence to diet behaviors may prevent or slow HF progression and may support regression of the HF syndrome. This, in turn, improves exercise tolerance, reduces physical findings and symptoms that negatively impact quality of life, and decreases morbidity.

Significance of the Problem and Impact on Nursing

Adherence to a low sodium diet is an important facet of the HF self-care treatment plan that is often lacking. Diet nonadherence promotes activation of neuroendocrine mechanisms responsible for HF exacerbation. Heart failure decompensation begets hospitalization, decreased quality of life, and may limit survival. Adherence to a low
sodium diet is a modifiable factor that patients can control and healthcare providers can augment through education, vigilant monitoring, and close follow-up.

Of all healthcare providers, nursing professionals are pivotal in augmenting patient understanding of diet principles and promoting diet adherence because nurses are most likely to carry out patient education interventions as part of their role. By determining predictors of diet adherence and incorporating the evidence into patient education interventions, adherence could lead to improved HF quality of life and decreased morbidity.

Few studies have been conducted on initiation, early maintenance, and long-term adherence to low sodium diet behaviors. Adherence to self-care behaviors, such as diet, is multidimensional and is influenced by patient attitudes, motivational factors (Miller, Hill, Kottke, & Ockene, 1997), relationship with self and others, readiness and ability to care for self, education, and scope in caring for self (Leenerts, Teel, & Pendleton, 2002). Education in recommended behaviors is essential (Leenerts et al.; Neily et al., 2002), but it is not enough. Behavior adherence is gained through self-efficacy (Buchmann, 1997). Self-efficacy is a cognitive variable that refers to patients’ beliefs regarding their ability and confidence to successfully carry out a course of action or perform a behavior (Bandura, 1977).

Many researchers have shown that perceived self-efficacy for a specific behavior is positively associated with behavior adherence (Holden, 1991; Ockene, Hayman, Pasternak, Schron, & Dunbar-Jacob, 2002). The literature provides examples of task-oriented interventions to increase perceived self-efficacy for a specific behavior (e.g., return demonstration); however, there is no evidence of an association between cognitive
(conceptual and perceptual) and emotional factors of illness threat and perceived self-efficacy for self-care behaviors. Specific cognitive factors that may predict the strength of perceived self-efficacy for a specific behavior are conscious awareness of conceptual illness information (accurate knowledge of illness as a threat and knowledge of a plan of self-care) and perceptual illness information (sensations, symptoms and other objective cues of illness severity). Emotional reactions to illness threat interact with illness cognition in multiple ways to influence behavior (Leventhal, Diefenbach, & Leventhal, 1992). Cognitive factors and emotional reactions may act together or individually to strengthen or weaken perceived self-efficacy and influence behavior (Leventhal et al.). A clearer understanding of illness cognition and emotion that may interact and predict perceived self-efficacy for low-sodium diet will provide a foundation for nurse-initiated diet education interventions to improve patient outcomes and decrease healthcare costs.

**Purpose of the Study**

This study examines patients’ perceived self-efficacy to adhere to a low sodium diet. By studying cognitive and emotional factors of illness threat that may strengthen perceived self-efficacy for a specific behavior, e.g., low sodium diet behavior, new knowledge could be gained that might redirect the focus of self-care education in HF and ultimately promote behavior adherence. This study will answer the question “when demographic, socioeconomic and history of medical condition factors are controlled, do cognitive illness threat factors and emotional reactions of illness threat predict the strength of perceived self-efficacy for low sodium diet behaviors?”
Theoretical Framework

In this study, cognitive illness threat factors and emotional reactions to illness threat thought to influence the strength of perceived self-efficacy for a specific behavior are derived from the Common Sense Model of Illness Representation framework (Leventhal, Meyer, & Nerenz, 1980). The Common Sense Model of Illness has the following elements: stimuli, illness threat, common sense model principles, illness representation attributes, coping behaviors and appraisal. Each element is described below and is depicted in Figure 1. In this explanatory model of behavior, researchers found that a patient’s theory of illness and treatment (their illness representation) led to goals for coping that played an important role in directing their behaviors (Leventhal et al.). Beliefs that influence how patients analyze and interpret their condition are formulated through information processing and construction of meanings for experiences. Data suggest that patients develop implicit models or beliefs about specific illnesses and disease threats and that these beliefs guide behavior (coping behaviors) (Bishop, Briedle, Cavazos, Grotzinger, & McMahon, 1987; Coutu, Dupuis, D’Antono, & Rochon-Goyer, 2003; Leventhal et al.; Vaughan, Morrison, & Miller, 2003; Ward, 1993).

Stimuli That Construct an Illness Representation

In this self-regulatory, information-processing model, information exposure (stimuli) and the level of danger and threat the information holds for a patient leads to coping behaviors (Lau, Bernard, & Hartman, 1989; Leventhal et al., 1980). The representation of HF that a patient holds, regardless of the accuracy of the beliefs (beliefs are accurate if they are consistent with contemporary medical and nursing science of HF), acts as a stimulus that leads to a cognitive perception of illness as a threat and prompts
emotional reactions to the illness threat. Both processes, the cognitive perception of
illness threat and the emotional reactions to threat, determine a patient’s coping behaviors
(Diefenbach & Leventhal, 1996) as depicted in Figure 1. Thus, the illness must be
perceived as a sufficiently severe enough threat to be the impetus that prompts cognitive
and emotional coping behaviors. Stimuli must include a conscious plan for how a person
can recover from their illness (self-care behaviors) so that a meaningful, adaptive, active
plan for coping can be formulated (Shaw, 1999). Thus, the stimuli that construct the
illness representation determine how the person will cope (Ward, 1993).

Illness Threat

In the Common Sense Model of Illness Representation, illness representation
stimuli heighten a patient’s awareness of the threat associated with an illness or medical
condition. Individuals have personal interpretations of illness threat (synonymous with
“health threat” in Figure 1) that are determined through parallel processing of two
systems: (a) psychologically objective, cognitive processing of the illness threat that
generates problem-focused coping (cognitive coping) and evaluative processes; and (b)
psychologically subjective, emotional processing system that creates feeling states and
the coping procedures (emotion-focused coping) and appraisal rules for the management
of emotion (Figure 1 and Figure 2). Together, these parallel processing systems lead to
specific plans of action if behavioral planning is carried out (Leventhal et al., 1980).
Thus, an active coping plan can prompt adaptive or maladaptive coping behaviors
depending on how a person cognitively and emotionally processes illness representation
stimuli. If the person does not process cognitive stimuli as a stressor or threat or does not
feel the need to regulate an emotional response (e.g., lack of or mild fear or distress), the
perceived level of concrete illness threat may be very low or nonexistent and may not lead to a coping plan (e.g., lack of adherence to a low sodium diet).

*Common Sense Model Principles*

The Common Sense Model of Illness Representation framework has three principles: (a) objective stimuli (events) and the subjective emotion associated with the events establish goals for coping; (b) adherence to protective recommendations requires the specification of goals in a picture or representation of danger; and (c) formation of an illness representation and the plan for action is based on highly concrete information (Leventhal et al., 1980). The present study uses all three principles of the framework to answer the research question: when demographic, socioeconomic and history of medical condition factors are controlled, do cognitive illness threat factors and emotional reactions of illness threat predict the strength of perceived low sodium diet self-efficacy?

The first principle suggests that cognitive processing of HF representation stimuli in conscious awareness is interpreted as an illness threat that creates both cognitive and emotional responses that establish goals for coping by strengthening perceptions of diet self-efficacy (in Figure 2, shaded boxes and double arrows are used to highlight the parts of the model that are described here). The second principle suggests that the level of illness threat directly influences coping behaviors. This study used self-administered surveys and objective HF severity information to measure the level of threat imposed by HF and emotional reaction to HF threat. Participant responses were used to determine if heightened illness threat and healthy emotional responses (absence of or mild depression) are associated with strengthened perceived diet self-efficacy (coping) that is known to promote diet adherence. The third principle implies that perceptual information; namely
sensations, symptoms, and other objective cues of illness severity, heightens a patient’s awareness of illness as a threat and prompts formulation of a coping plan (self-care behavior). This principle was studied directly, as was the hypothesis that even in the absence of perceptual information, accurate conceptual information heightens a patient’s awareness of illness as a threat and prompts formulation of a coping plan.

*Illness representation attributes.* In the Common Sense Model of Illness Representation framework, Leventhal et al. (1980) outlined five common attributes of an illness representation: (a) identity; e.g., knowledge and sensation of symptoms, however accurate the symptoms are; the “condition label”, that is the label a patient gives to identify the presence or absence of their illness; and/or other conceptual or perceptual images that are used to identify the illness seriousness; (b) timeline or beliefs about the course of an illness (acute or chronic); (c) consequences or the short-and long-term effects or outcomes of an illness; (d) cause or factors leading to an illness or perceptions about the origin of the illness; and (e) cure or control; e.g., what the person can do or has done in the past to recover (Keller, Ward, & Baumann, 1989; Leventhal et al.). A patient’s illness representation is created and defined by these five attributes. These attributes are cognitively processed to give meaning to the illness and prompt an emotional response. The patient’s interpretation of the illness representation becomes the stimulus (Figure 1) that prompts a level of threat and vulnerability. Illness representation attributes were found to be consistent across many different diseases (Lau et al., 1989; Turk, Rudy, & Salovey, 1986). Ultimately, the cognitive (conceptual and perceptual) threat or danger imposed by the illness representation and the emotional response to the illness threat predict coping behaviors (Figure 1 and Figure 2). As seen in Figure 3 and 4,
depression is the emotional response that is assessed in this study. It is operationally defined below.

**Coping behaviors.** Coping behaviors are the procedures formulated for the management of the cognitive illness threat and the emotional reactions associated with the threat (Leventhal, Hudson, & Robitaille, 1997). Coping behaviors can be complex and diverse since they are individually shaped and designed to decrease the level of illness threat derived from processing of illness representation attribute information. Essentially, coping behaviors attempt to resolve or redefine the illness representation problem (Leventhal et al.). Ultimately, the level of cognitively derived threat imposed by a person’s HF representation and the emotional response to the illness threat are parallel processes patients engage in when they are problem solving (and developing a coping plan) about their illness. In this study, as seen in Figure 4, coping is defined as the strength of participants’ perceived low sodium diet self-efficacy. Total perceived low sodium diet self-efficacy and three factors of perceived diet self-efficacy were assessed (resisting relapse, reducing salt and behavioral skills) to measure coping behavior.

**Appraisal.** Appraisal refers to the evaluation of the effectiveness of coping responses. Attributes of an illness representation not only shape the procedures for coping, but also play a role in appraisal (Leventhal et al., 1992). Patients assess and evaluate their coping behaviors as progress or failure based on changed or updated illness representation stimuli (Leventhal et al., 1980). The appraisal process prompts an altered representation that reflects recovery, adequate treatment, or prevention (Leventhal et al., 1997) and prompts altered coping responses as needed. A patient’s common sense model of illness is an ongoing self-regulated process of illness representation processing, coping
behaviors, and reappraisal that has been demonstrated to sustain adherence to self-care behaviors and ensure long-standing treatment outcomes (Leventhal et al.). The present study examined aspects of the parallel processes of the Common Sense Model of Illness Representation theoretical framework: HF as a cognitive (conceptual and perceptual) illness threat and depression as an emotional response of HF illness threat as the independent variables that predict diet self-efficacy, the dependent variable (as depicted in Figures 3 and 4) to determine the adequacy of this health behavior promotion model in promoting low sodium diet self-efficacy.

Operational Definitions of the Common Sense Model of Illness

The background associated with self-efficacy and the cognitive and emotional processes of the framework as depicted in Figure 4 will be addressed in Chapter 2, however, operational definitions and connections of the Common Sense Model of Illness Representation are explained here.

HF Representation as an Illness Threat

The first of two processes, HF representation as an illness threat, was studied by (a) examining the level of accuracy of conceptual information (illness beliefs) that helps to formulate a HF representation and by (b) assessing the level of perceptual information, e.g., objective signs, symptoms, sensations, or situations (in this study, the label used is objective cues) of HF severity that make up a HF representation. For this study, accuracy of HF illness beliefs is defined by how well a patient’s HF illness beliefs (that make up a HF representation) match contemporary medical and nursing HF science. The closer the match between medical and nursing beliefs about HF and patients’ views of illness beliefs, the greater the accuracy of HF illness beliefs that make up a HF representation.
Objective cues of HF severity are defined as concrete, real-world signs, symbols, sensations or situations that reflect the severity of HF. In this study, objective cues of HF severity are type of physician practice, hospitalization within 30 days, participation in a HF research study within three months of questionnaire completion, evaluation or enlistment for cardiac transplantation, and functional status. Leventhal and Nerenz (1983) suggest that the greater the accuracy of illness beliefs and the greater the exposure to objective cues that reflect illness seriousness, the greater the illness threat.

The Emotional Response of HF as an Illness Threat

The second process, the emotional response of HF as an illness threat, was assessed in this study by examining the level of depression. Depression is defined as an adjustment disorder with depressed mood secondary to a physical illness (American Psychiatric Association, 1994). Stated differently, depression is conceptualized as a reaction to a situation rather than a primary illness in and of itself. A patient’s emotional response to illness representation stimuli leads to the development of coping behaviors (Leventhal, Nerenz, & Steele, 1984). Depression is known to cause disability and worsen prognosis in people with various medical conditions (Kroenke, 1997); thus, depression may suppress development of coping behaviors. Depression occurs commonly in patients with HF. Its frequent occurrence warrants further study of its effect on coping. In HF, it is unknown if depression occurs as an emotional response to illness representation threat or is due to some other cause. In this study, level of depression was defined by the sum score on the measurement tool, *Nine Symptom Checklist*. The *Nine Symptom Checklist* is congruent with adjustment disorder with depressed mood as defined in this study. It has previously been used in similar non-psychiatric patients who suffer depression secondary
to a chronic condition. Level of depression was created by the sum score of the nine
items on the tool (sum score is stratified into five categories from not depressed to severe
depression) and used to assess how depression is related to perceived diet self-efficacy. In
addition, the interaction effects of depression and accuracy of patient’s HF representation
stimuli will be addressed in the discussion of findings. This information could influence
patient education methodology and depression treatment. Ultimately, learning if
depression predicts perceived diet self-efficacy will promote further study of its relation
to behavior adherence. This study does not measure low-sodium diet adherence;
however, learning if a relationship exists between predictor variables and diet self-
efficacy provides a foundation for further study.

Both processes, HF representation as an illness threat and the creation of an
emotional response, lead to patient adaptation through the development of coping
behaviors (Diefenbach & Leventhal, 1996). Three factors—accuracy of HF illness
beliefs, number of objective cues of HF severity, and level of depression as an emotional
response—were studied as predictors of perceived diet self-efficacy while controlling for
the following variables that could influence the associations discussed above: age, race,
gender, socioeconomic status, marital status, and education level. Socioeconomic status
was studied by assessing responses to two variables: someone to confide in (subjective
belief about being socially connected to another person or people; can be relative, friend,
or acquaintance who share everyday stories, feelings, concerns, desires, and needs on a
regular or intermittent basis) and comfort living on income (subjective belief about the
ability to live adequately on the level of income the family provides). History of medical
conditions were also studied, such as, history of medically managed diabetes mellitus,
asthma, chronic obstructive pulmonary disease (COPD), and atrial fibrillation. These medical conditions were chosen because they exhibit symptoms that may mimic worsening HF (Figure 3). As can be seen in the proposed theoretical model for this study (Figures 3 and 4), cognitive (problem-focused) and emotion-focused coping responses can be expressed through a single outcome, perceived diet self-efficacy. Diet self-efficacy can be quantitatively (objectively) measured as an outcome in terms of perceived total strength. In addition, the strength of three factors of perceived low sodium diet self-efficacy can be measured by studying resisting relapse, reducing salt, and behavioral skills.

In summary, the researcher hypothesized that the accuracy of cognitive, conceptual illness beliefs that make up HF representation attributes (that act as stimuli that are processed to heighten HF as a illness threat and promote coping actions) and the level of perceptual information or number of objective cues that make up a person’s HF representation were important determinants of perceived diet self-efficacy that promote subsequent self-care diet behavior adherence. The same HF representation stimuli and subsequent illness threat (as well as other possible stimuli) creates emotional responses that lead to the development of coping behaviors. In this study, strengthened perceived self-efficacy for low sodium diet behaviors is a cognitive coping action that could reduce the illness threat. In HF, strengthened perceived diet self-efficacy could promote low sodium diet behavior adherence.

Unlike other health behavior models, the Common Sense Model attempts to conceptualize the processes involved in the construction of judgments of vulnerability, severity, and effectiveness to promote coping. Advantages and disadvantages of using the
Common Sense Model of Illness Representation framework are based on its many assumptions. This model presumes that: (a) a person’s illness representation is multidimensional and is defined by both abstract and concrete terms; (b) the cognitive information processing system, that is stimulated by conceptual and perceptual illness information, is not directly observable (implicit); (c) cognitive-processing that produces behavior incorporates situational, motivational, and individual factors that can be cultural and personal; (d) a person’s illness representation is constantly updated as new information is processed; therefore, it is constantly changing in nature; and (e) people are active problem solvers; thus, specific stimuli are perceived and interpreted to direct behavior (Leventhal & Nerenz, 1983; Leventhal & Nerenz, 1985). These assumptions provide a real-world context to problem solving and the development and adherence to specific coping behaviors that is not found in other health behavior models. Commonsense interpretations can be influenced by psychological, cultural, and personal factors as well as past experiences, treatment experiences and new knowledge.

The Common Sense Model focuses on a person’s implicit (or common sense) belief system to prompt coping. When the Health Beliefs Model demonstrated only modest predictive power, Leventhal et al. (1980) and Turk et al. (1986) documented that the cognitive structures that form illness representations may not be represented verbally or openly; therefore, explicit beliefs are not a focus of illness and treatment.

In the Common Sense model, the coping plan is presumed to be active. Passive planning may be an antecedent to the intention to act, but it is behavior defined by the coping plan that prompts appraisal (Shaw, 1999). Coping changes over time with
reappraisal. Problem-focused and emotion-focused coping style is individualized and often based on personality.

Variables

Variables specified in the study framework (Figure 4) are illness beliefs, objective cues of HF severity, depression, perceived low sodium diet self-efficacy, and controls. In this study, control variables were selected that predicted self-care behaviors in other HF studies or were known to promote symptoms that mimic worsening HF (diabetes, asthma, COPD, and atrial fibrillation). Gender, marital status, socioeconomic status, and education level were positively associated with self-care in studies of self-care behaviors in patients with HF (Artinian, Magnan, Sloan, & Lange, 2002; Ni et al., 1999; Rockwell & Riegel, 2001). While it is unknown if these and other variables influence perceived diet self-efficacy, controlling them provides evidence of their possible effect.

Variables were operationalized by tools that measure the accuracy of HF illness beliefs, the number of objective cues of HF severity, the level of depression, and the strength of perceived low sodium diet self-efficacy. In addition, some variables were operationalized by their presence or absence, e.g., history of demographic, socioeconomic and medical conditions factors. Refer to Appendix A for variables listing and conceptual and operational definitions, tool names and descriptions.

Perceived diet self-efficacy was measured by assessing mean total score and mean scores of its three factors, resisting relapse, reducing salt, and behavioral skills (Figure 4). Resisting relapse refers to the patient’s perceived ability to stick to diet behaviors when challenged by circumstances or people. Reducing salt refers to the patient’s perceived ability to decrease the consumption of table salt and sodium found in processed foods.
Behavioral skills refers to the patient’s perceived ability to take active measures to reduce sodium intake (e.g., reading labels for sodium content).

_Hypotheses and Rationale_

Hypotheses in this study were:

1. Patients with accurate HF illness beliefs have strengthened perceived diet self-efficacy.

2. Patients with a greater number of objective cues of HF severity have strengthened perceived diet self-efficacy.

3. In patients with asymptomatic or mild HF (defined as functional status I or II), those with accurate HF illness beliefs will have greater strength in perceived diet self-efficacy than those with inaccurate HF illness beliefs.

4. Patients with higher level of depression have weakened perceived diet self-efficacy.

5. Accuracy of HF illness beliefs, number of objective cues of HF severity, and the level of depression together explain a statistically significant amount of variance for perceived diet self-efficacy, and

6. The relationships in Hypothesis five hold when controlling for age, race, gender, socioeconomic status (someone to confide in and comfort living on family income), marital status, education level, and medical history of medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation.

Hypotheses One, Two, Four and Five measure the two parallel processes of illness threat interpretation thought to influence perceived diet self-efficacy: cognitive factors (conceptual and perceptual) and depression as an emotional reaction. These
hypotheses were based on the Common Model of Illness Representation theoretical framework that suggests that responses to illness threat predict self-care behavior. Hypothesis Three suggests that conscious awareness of conceptual illness information (accuracy of HF illness beliefs), in the absence of activity-exercise limiting symptoms (functional status I or II HF), predicts perceived diet self-efficacy. If this theorized phenomenon was supported, implications could prompt broadening of low sodium diet adherence educational efforts from the current focus of following the diet plan to prevent and minimize symptoms and other objective cues to one that focuses on preventing progression of HF, even when asymptomatic. Patients may be more likely to adhere to a low sodium diet if their HF representation is composed of accurate illness beliefs and understand that HF can worsen silently. Hypothesis Six specifies that the relationships inherent in the Common Sense Model of Illness Representation hold when controlling for age, race, gender, socioeconomic status, marital status, education level, and history of medical conditions that are highly prevalent in patients with HF. Essentially, it is believed that the variables that make up the Common Sense Model of Illness Representation framework are stronger than demographic, socioeconomic, and medical history condition factors cited in explaining the variance in perceived diet self-efficacy. Figures 3 and 4 highlight these relationships.

This study represents the first step in my program of research on diet self-efficacy. Knowledge gained from this study may provide the foundation for future research and be the basis for an educational intervention. Currently, little is known about predictors of perceived diet self-efficacy or self-efficacy for other behaviors recommended in HF management. Information learned through this study will provide
evidence of relationships in variables that have not been examined in past research. This study attempted to determine the relevancy of HF representation stimuli (accurate illness beliefs and objective cues of HF severity) and depression on perceived diet self-efficacy and ultimately provide information important to nurses who participate in health behavior promotion.

In Chapter 2, the literature review section, themes related to the primary problem, diet nonadherence, will be addressed. Concepts specific to this study are discussed.
Stimuli § refer to information exposure that is organized, analyzed and interpreted to form implicit theories of illness and treatment (illness representation). Stimuli that produce conceptual (knowledge based) and perceptual (sensation/symptom based) information has many sources: interactions with others, media; current sensations and symptoms; and past experiences. An illness representation constructed from stimuli generally has five attributes: identity, timeline, cause, consequences and cure/control.

Cognitive (objective) a and emotional (subjective) b processing of stimuli (illness representation) as a health threat leads to goals for coping and coping behaviors c; thus, illness representation forms a focus for self-regulating cognitive and emotional behaviors. When processing illness representation information, a valid and believable danger must be formed to derive an effective image of coping reaction. Note: the term “health threat” used here is synonymous with illness threat, used in the text and in Figures 2 and 3.

Appraisal d involves determining the effectiveness of coping behaviors. Results of the appraisal process lead to alterations in the illness representation itself or in coping responses. Thus, appraisal forms a feedback loop that influences stimuli and ultimately promotes behavior adherence.

Figure 1. Common Sense Model of Illness Representations theoretical framework as described in the literature (Diefenbach & Leventhal, 1996).
Illness Representation is derived from information that is organized, analyzed and interpreted to form implicit theories of HF and HF treatment.

HF representation is processed *cognitively* (objectively) \(^a\) to form the level of threat, danger and vulnerability imposed by HF. HF representation is also processed *emotionally* (subjectively) \(^b\) to form a feeling state imposed by both the HF representation itself and by the cognitive processing of the HF representation. The two processing systems ultimately determine the level of threat imposed by HF and lead to goals for coping and coping actions. If HF is believed to be a great danger or threat and feeling states are ones that are likely to promote healthy coping to manage the emotional responses, coping will include self-care behaviors that are known to improve HF quality of life and decrease morbidity: low sodium diet, regular exercise, medication plan adherence, assessment for new or worsened signs/symptoms and fluid management (includes daily weight monitoring and fluid restriction, when needed).

Appraisal process: same as Figure 1.
Variables to be controlled: age, race, gender, socioeconomic status, marital status, education level, and history of medical conditions: e.g., medically managed diabetes mellitus, asthma, chronic obstructive pulmonary disease and atrial fibrillation.

**Figure 3.** Hypothesized model of health threat as it applies to heart failure. (Uses the Common Sense Model of Illness Representation theoretical framework).

Cognitive processing of HF representation \(^a\); emotional processing of HF representation \(^b\).

Low sodium diet adherence is influenced by the strength of a patient’s perceived diet self-efficacy. It is theorized that perceived diet self-efficacy is based on a patient’s implicit model of HF and the level of danger or threat that is imposed by the HF representation. Specifically, it is theorized that greater accuracy of conceptual illness beliefs (implicit knowledge) and greater number of objective cues of HF severity will strengthen perceived diet self-efficacy. In addition, it is theorized that emotional responses to HF representation and the threat imposed by HF can influence the strength of perceived diet self-efficacy. In this study it is theorized that higher levels of depression will weaken perceived diet self-efficacy as a coping response.
Accuracy of HF Illness Beliefs

Objective Cues of HF Severity
- Type of physician practice
- Hospitalization in 30 days before completing questionnaire
- Participation in a research study within 3 months of questionnaire completion
- Evaluation or enlistment for cardiac transplantation
- Functional status

Depression as an emotional response to HF representation illness threat

Perceived Diet Self-Efficacy
- Resisting Relapse
- Reducing Salt
- Behavioral Skills

Variables to be controlled: age, race, gender, socioeconomic status (someone to confide in and comfort living on income), marital status, education level, and history of medical conditions: medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation.

Figure 4. Hypothesized model of illness threat as it applies to heart failure with components of each variable.
Chapter II Review of Literature

In this chapter, the importance of low sodium diet in the HF treatment plan is discussed. The outcome variable, self-efficacy as a promotion of behavior, and the predictor variables, based on the Common Sense Model of Illness framework, are presented based on what is known from current literature.

Importance of Low Sodium Diet in the Treatment Plan

While pharmacologic therapies provide survival, morbidity, and quality of life benefits in properly designed, well-conducted research trials (ACC/AHA Task Force, 2001), there is a great need to promote non-pharmacologic therapies, especially self-care behaviors, to improve patient outcomes (Dracup et al., 1994). Non-pharmacologic self-care behaviors include maintaining a 2,000-milligram (low) sodium diet, regular exercise, daily weight monitoring, fluid restriction (in advanced condition), and ongoing communication with health care providers when new or worsening signs and symptoms occur. Of all non-pharmacologic self-care behaviors, maintaining a low sodium diet is one that is critically important in preventing hospitalization (Bennett et al., 1998; Joshi, Mohanan, Sengupta, & Salkar, 1999). Attention to diet self-care behaviors provides additive benefit to pharmacologic therapies by decreasing hospitalization rates and costs (Koelling, Johnson, Cody, & Aaronson, 2005) and might reduce mortality statistics.

Diet advice and adherence are important aspects of a HF treatment plan. Consensus guidelines by the AHA and ACC recommend that patients with HF maintain a
2,000-3,000 milligram per day sodium restriction (ACC/AHA Task Force, 2001; Grady et al., 2000). Low sodium diet adherence prevents acute decompensation and can reduce the dose of diuretic therapy (Krauss et al., 2000). Dietary sodium restraint is important since the kidney reabsorbs sodium, leading to an unfavorable positive sodium balance (Soler-Soler & Permanyer-Miralda, 1994). Adhering to a low-sodium diet is a challenge, especially since three-fourths of sodium ingested is found in processed foods, not in a salt shaker (Albert, 2005). Excessive sodium intake is associated with adverse outcomes.

Since investigators have linked sodium retention to hospitalization and have also reported the problem and consequences of non-adherence to diet, patient education programs have focused on providing practical, skills-oriented information about low sodium diet self-care (Koelling et al, 2005). Specific diet education thought to promote behaviors consistent with adherence include reading and monitoring processed food labels for sodium content, keeping the saltshaker off the table, avoiding salty snack foods, and making low-sodium food choices when eating out.

While knowledge of skills was found to significantly increase low-sodium diet adherence in cardiac (Barnes & Terry, 1991) and hypertension patients (Luft, Morris, & Weinberger, 1997), both research teams reported that an intensive skills-oriented educational effort was not enough. Dietary compliance was more highly associated with patients’ attitude scores than skills-knowledge scores (Barnes & Terry) and patients’ motivation for behavior change (Luft et al.). Therefore, it is imperative that specific cognitive and emotional determinants that impact attitude and motivation be identified to strengthen optimal HF diet behaviors. Once cognitive predictors that influence attitude
and motivation are learned, they can be incorporated into the teaching plan to give diet skills more meaning and to enhance diet adherence.

Self-Efficacy and Self-Efficacy Promotion of Behavior

Self-efficacy is a component construct of social cognitive theory (also known as social learning theory) first introduced by Bandura in 1977. It incorporates cognitive, motivational, affective, and selective processes to promote behavior adherence. Perceptions (or confidence or beliefs) of self-efficacy in one’s capability to organize and execute the course of specific actions to deal with situations and attain behaviors have influenced how people think, feel, and act and have led to a significant independent effect on specific behavior performance, even during times of stress (Bandura, 1982; Maibach & Murphy, 1995; Strecher, McEvoy, Becker, & Rosenstock, 1986).

Holden (1991) published a meta-analysis of quantitative correlation studies that examined the relationship of perceived self-efficacy to subsequent health-related outcomes. A total of 227 articles were reviewed and 56 studies from 1981 to 1989 were included in the final sample. There were no studies of patients with HF and only two studies of patients with cardiac disease. Both cardiac samples were post myocardial infarction patients being studied for their self-efficacy for physical activity. In this review of over 3200 subjects by Holden, the overall across study unadjusted effect size of the relationship between self-efficacy and health related outcomes was significant ($r = .33$; adjusted effect size $r = .26$ and $p < 0.00001$). For subjects engaged in exercise behaviors, there was a medium effect size ($r = .34$, $p < 0.0001$) and a statistically significant effect size was found in people engaged in weight loss behaviors ($r = .16$, $p < .0005$). Holden’s meta-analysis contained the study that examined the utility of self-efficacy in predicting
changes in dietary fat and sodium after an educational intervention. In that study of healthy Mexican Americans, the effect size (r = .05) was small (Holden).

Despite the latter’s modest findings, the overall meta-analysis supports the strengthening of perceived self-efficacy to promote and maintain behavior. The evidence of self-efficacy appraisal and dietary behaviors in patients with coronary heart disease was limited and no studies were conducted in patients with HF. Yet, the overall association between self-efficacy and behavior was significant, suggesting that this is an important relationship to examine in research with this patient population. In more recent studies of patients with HF, no experimental or quasi-experimental studies focused on predictors of perceived diet self-efficacy, on the actual level of self-efficacy for a low-sodium diet, or on factors predicting actual diet adherence.

Relating Self-Efficacy and the Common Sense Model of Illness

In this study of patients with HF, the Common Sense Model of Illness Representation theoretical framework is used to predict cognitive coping. Assessment of cognitive coping is conducted by examining the strength of perceived diet self-efficacy. In the Common Sense Model, the patient’s perspective is used to determine the threat HF poses and to select and execute responses to the information contained in their HF representation. As a coping procedure, the strength of a patient’s perceived diet self-efficacy is a result of self-regulation of HF as a threat and having a plan for coping. The threat HF poses is derived from the parallel processing of two systems: (a) cognitive, which includes both conceptual and perceptual information; and (b) emotional reactions to illness threat. In this study, cognitive illness threat was hypothesized to be based on the accuracy of HF illness beliefs and on the number of objective cues of HF severity. It was
theorized that the cognitive processing of HF representation stimuli as a meaningful threat or danger would lead to the development of a coping plan that strengthens perceived diet self-efficacy. Additionally, it was theorized that the emotional response to both the HF representation itself and the cognitive HF threat derived from processing of HF representation stimuli triggers healthy or unhealthy coping by strengthening or weakening perceived diet self-efficacy. Bandura (1982) documents that the strength of perceived diet self-efficacy supports initiation and maintenance of low sodium diet behaviors and in one study of patients with HF, self-efficacy related to illness management had a strong negative association with depression (Tsay & Chao, 2002). Optimization of and adherence to HF diet behaviors may improve quality of life and morbidity.

For this study, then, the theoretical model and variables of interest used to predict perceived diet self-efficacy are found in Figures 3 and 4 and in Appendix A, respectively. Empirical evidence supports a cause and effect relationship between the level of perceived self-efficacy for a specific behavior and performance attainment, regardless of the method used to increase self-efficacy (Bandura, 1990). Strong evidence indicates that perceived self-efficacy for a specific behavior influences behavioral outcomes (Holden, 1991). Perceived diet self-efficacy has predicted diet behavior in healthy people, cardiac patients and other patient populations. No reports were found that specifically studied self-efficacy, or specific cognitive predictors of diet self efficacy for diet management in patients with HF. Thus, for effective programs for improving HF diet adherence to be produced, research must highlight the role of influential cognitive predictors of self-efficacy.
No reports were found that studied the effect of illness threat on perceived self-efficacy, similar to the framework of this dissertation. In conducting a thorough review, I found reports of self-efficacy as a function of other related variables, some of which were relevant to patients with HF, but in these studies self-efficacy was used in a global context and was not specific to one behavior. No studies were found in which self-efficacy for any self-care behavior was the dependent outcome variable. Further, I found no reports of self-efficacy theory and low-sodium diet behaviors or other health-promoting behaviors/outcomes as study variables in a controlled, randomized, setting or in experimental methodology of patients with HF. Thus, research is still needed to determine if cognitive variables of illness threat and emotional reactions to illness threat predict self-efficacy for a specific self-care behavior, such as, low sodium diet optimization and adherence.

Since no studies were found of perceived diet self efficacy as a predictor of low sodium diet behaviors or studies that used self-efficacy as the dependent variable, a literature search of self-efficacy as a predictor of self-care behaviors was conducted. Two studies in HF reported the influence of self-efficacy on self-care. Ni et al. (1999) studied self-efficacy for controlling symptoms and maintaining health status and found that having confidence (self-efficacy) to maintain health was a significant predictor of self-care. Unfortunately, the two questions used to identify self-efficacy were broad in scope and were not related to one self-care behavior; therefore, the value of the results is limited. In a prospective design, Kempen, Sanderman, Miedema, Meyboom-de Jong, and Ormel (2000) studied the strength of perceptions of self-efficacy for functional disability in newly diagnosed patients with HF. Researchers found that patients with weak self-
efficacy had significantly greater functional decline. As in the previous study, the self-efficacy tool assessed global/general self-efficacy, rather than self-efficacy for a particular behavior (activity). These studies are examples of self-efficacy used as an independent variable to predict self-care behaviors in patients with HF. While gaps in the literature still exist, these reports provide evidence of an association between self-efficacy and behavior in the population of interest and encourage further study.

Literature searches produced limited research on the specific concepts of interest; thus, research on predictors of self-care were sought to determine if illness beliefs of HF, objective cues of HF severity, and depression were associated with self-care behaviors. The results of this review of literature will be presented after an examination of the Common Sense Model of Illness Representation theoretical framework is presented in the context of this dissertation.

The Common Sense Model of Illness Representation

A summary of the Common Sense Model of Illness Representation model is presented in the Introduction (Chapter 1) and reviewed in the context of HF and this study’s theoretical framework in Figures two, three, and four. The Common Sense Model was developed by Leventhal and others in response to research results on behavior, illness threat, and compliance and was first discussed as an explanatory model of behavior in 1980 (Leventhal, et al., 1980).

HF Representations: Background As Applied to This Dissertation

The Common Sense theoretical model is based on the following principles of behavioral regulation. An illness representation is created when a person organizes, analyzes, and interprets internal and external information about an illness and gives it
meaning (Lau et al., 1989). People construct a common sense model of illness representation that strongly resembles their prior illness experiences (Meyer, Leventhal, & Gutmann, 1985) and use an illness representation to guide how they cope with health and illness (Ward, 1993). Processing of information is repetitive and is cycled through stages from representation to coping to appraisal as representation and coping responses are repeatedly constructed and evaluated. The evaluation feeds back into the knowledge system to reshape the illness representation (Leventhal et al., 1984). Long-term adherence to self-care behavior recommendations requires exposure to information about the danger of an illness (attributes of identity, timeline, consequences, and cause) and about a specific plan for action (control or cure attribute). Therefore, exposure to information about an illness threat can lead to action if accompanied by behavioral planning (Leventhal et al., 1980; Donovan & Ward, 2001).

Attributes of the Common Sense Model of Illness Representation framework must be understood and used in context to the specific illness of interest. In this study, identity, timeline, consequences, and control are hypothesized as important attributes of HF, but patients may be uninformed of specific details of these attributes by health care providers. Therefore, the basis for patients’ actual beliefs of HF may be inaccurate.

Attributes of the model in this study. In the proposed theoretical model, four attributes of an illness representation (identity, timeline, consequences, and cure/control) will be used and one deleted (cause). Two of the four attributes, identity and cure/control, will be defined based on their importance in HF.

Identity will be used more globally than as it is commonly described in the Common Sense Model of Illness Representation literature. Highly concrete information
plays a central role in the formation of both the representation and the plan for action (Leventhal et al., 1980). In a study of hypertensive patients, researchers found that patients’ representations were derived mainly from prior illness experiences; specifically from bodily sensations and symptoms (Meyer et al., 1985). Hypertension and HF are similar in that both conditions can progress even when patients do not have symptoms. Patients with HF may not understand the silent processes of HF pathophysiology and seriousness that could influence the identity, timeline, consequences, and cure/control attributes of HF representation.

Accurate HF illness beliefs that make up a HF representation include patient understanding of the silent processes that worsen the HF condition and directly lead to condition severity and symptoms. Therefore, in this dissertation the identity attribute of a HF representation will not refer merely to symptoms or the label HF, but to knowledge of the silent processes of HF. In HF, identity includes conceptual information about the underlying neurohormonal and ventricular remodeling processes that occur silently to worsen patient outcomes, often well before symptoms emerge. Silent pathophysiologic processes are initially adaptive but become maladaptive over time and lead to other silent pathophysiologic processes: pump failure, low ejection fraction, and arrhythmias. Eventually, patients exhibit decreased exercise tolerance and other signs and symptoms that lead to morbidity and mortality (Albert, 1999).

As previously defined in Chapter 1, timeline refers to beliefs a person has about the course of an illness. Consequences refer to the short-and long-term effects or outcomes of an illness. Heart failure is an on-going, progressive condition with poor
survival and much debilitation due to hospitalization. Thus, accurate HF illness beliefs include a chronic timeline and poor prognosis.

Measures of recovery that cure HF are not a focus since HF is a chronic condition that is generally incurable. However, in determining the accuracy of illness beliefs, both words, cure and control, are used in relation to measures that decrease the illness threat. Control is defined for this study as self-care behaviors patients take to maintain health and well-being. Overall accuracy of illness beliefs is studied as a predictor of perceived diet self-efficacy that promotes self-care diet actions known to improve outcomes.

Cause, the fifth attribute, will not be addressed since the focus of this study is to determine predictors of perceived diet self-efficacy that might promote behavior adherence in patients who have already been diagnosed with HF. Cause is relevant only to illnesses that come and go (like flu) or to preventing future acute or chronic illnesses. As further substantiation for omitting cause in this study, causal attribution was not related to adherence to treatment in patients with hypertension (Meyer et al., 1985). In reports that aimed to predict adjustment based on cause of illness, no relationship was found (Ward, 1993). In HF, cause or etiology of HF does not impact the overall treatment regime and plays no role in low-sodium diet behavior. Thus, this study uses only four of the five attributes of a HF representation; e.g., identity, timeline, consequences, and cure/control, to learn if accurate HF illness beliefs predict diet self-efficacy.

Relating illness representation to self-efficacy. An illness representation guides coping as an adjunct to medical treatment (Leventhal et al., 1980). Specifically, bodily sensations and symptoms of HF can strengthen perceived self-efficacy for performing protective or self-care behaviors, such as health monitoring. In addition, when patients
link specific attributes of a HF representation in a meaningful way, coping actions may be enhanced. For example, linkage of the silent processes of HF (identity) and control attributes, linkage of timeline and control attributes, and linkage of consequence and control attributes of a HF representation may strengthen patients’ perceived self-efficacy for a specific behavior as a cognitive coping mechanism to decrease the inherent danger and threat created by the representation. In studies of patients with cancer, researchers found that patients gained increased self-control and feelings that they could manage their existence as a means to cope with information contained in representations (Leventhal et al., 1980). Illness representation threats could activate and strengthen perceptions of self-efficacy for a specific behavior as a means to overcome barriers to performance (Leventhal et al., 1992). In the Common Sense Model, illness representation threats serve as targets for interpretation and for the cognitive processes of self-efficacy that influence actions and behaviors. Therefore, self-efficacy is a cognitive outcome that is used to understand how the patient’s behavioral system came into being and also to understand if illness representation actually determines the ongoing processes of self-management and adherence to behaviors (Leventhal et al., 1992).

Since the attributes that make up a HF representation include illness beliefs (that may or may not be accurate with contemporary medical and nursing science) and objective cues of HF severity, both aspects must be studied to determine if a HF representation predicts perceived diet self-efficacy. Together, it is hypothesized that illness beliefs and objective cues provide the basis for how patients organize, analyze, and interpret their HF condition; the level of danger and threat associated with HF;
emotional responses to threat; and coping responses that impact self-efficacy and self-care behavior (Figure 2).

**Cognitive HF Threats That May Predict Self-Efficacy**

Accurate cognitive conceptual (knowledge) and perceptual information about HF will influence a HF representation as a threat or danger and may impact coping responses. In HF, there is often a disparity between worsening condition and cognitive illness threats since left ventricular function can worsen in the absence of symptoms and signs and symptoms of HF may be misinterpreted by patients. It is important to learn what associations currently exist between cognitive information about HF and coping responses so that nursing research, education, and clinical practice activities are geared toward optimization of adaptive self-care behaviors.

*Illness beliefs based on accuracy of knowledge of HF.* Heart failure is most often managed using an acute *episodic approach* that focuses on treatment of symptoms, rather than a *holistic approach* that focuses on evidence-based therapies known to improve survival and morbidity (not just symptom management) and incorporates primary and secondary prevention in the plan of care. Thus, patients may lack accurate conceptual information about HF, preventing construction of an accurate HF representation. In many qualitative studies, patients associated symptoms with HF severity (Rogers et al., 2000; Russell, Geraci, Hooper, Shull, & Gregory, 1998), but did not understand the silent processes that negatively impact identity, timeline, and consequences attributes of a HF representation, especially when there were no symptoms. In these studies, patients expressed a desire to learn more about HF. Most common were requests for information on identity and consequences attributes of a HF representation. In another qualitative
study of 19 patients with decompensated HF, Horowitz, Rein, and Leventhal (2004) found that patients had inadequate information about HF representation attributes, including what to do to control or to treat exacerbation.

A literature search was conducted of HF media and health care provider messages since HF representation information is frequently obtained in these ways. A review of written and Internet HF information handouts were found to include only partial, hopeful information about identity, timeline, and consequences attribute information (American Academy of Family Physicians, 2001; Flavell & Stevenson, 2002). Therefore, when a HF representation is constructed on past experiences and incomplete conceptual information, patients may not understand the danger associated with HF and may not be sufficiently motivated to follow the recommended plan of self-care as protection from further danger.

Research literature on conceptual HF illness beliefs was found by searching for studies of what patients know or want to know about HF. In a study that assessed if patients were ignoring basic care strategies in managing HF, researchers asked 58 internal medicine and 22 cardiology patients to answer six simple questions by responding to two alternatives (either yes or no or choice a or b). When asked if the doctor was treating congestion as a result of a problem with the lungs or heart, only 37% of patients knew their congestion was due to heart dysfunction. When asked if salt restriction was important to manage their present condition, only 16% of patients responded affirmatively (Horan et al., 1999). In a study that explored the concept of uncertainty in patients with HF, patients knew what was wrong with them, but had high uncertainty related to understanding what was going to happen to them (consequences) and how bad their symptoms would become (timeline) (Winters, 1999).
Determining patients’ learning or education needs was another method of obtaining research on conceptual HF illness beliefs. Luniewski, Reigle, and White (1999) distributed 12 cards containing educational questions to 30 hospitalized patients and asked them to sort the cards in priority of information needs. The three most important questions to patients were: What is wrong with my heart? What is the future of my disease? How will I know my HF is getting worse? These identity, timeline, and consequences questions preceded the need for education on questions about diet, medications, medication side effects, sexual activity, risk factors, weight gain, exercise, and family information. In another study, investigators examined the perceived learning needs of 84 patients with systolic dysfunction from two hospital settings (Wehby & Brenner, 1999). Ninety-eight individual items were analyzed and grouped into eight subscales. Of these, patients perceived medication and signs and symptoms knowledge as the two most important factors. General HF information (identity) and prognosis (consequences) items were found to be more important than activity, psychologic needs, and diet. Unlike the patients’ priorities, their nurses ranked the patients’ need for general HF information as fifth in priority (of eight subscales) and the need to know prognosis as least important (Wehby & Brenner). The wording of the general HF information and prognostic items may have influenced patient and nurse ranking.

These reports emphasized that patients are not provided enough HF illness information to develop accurate HF illness beliefs. Nurse education was focused on the control attribute of a HF representation and related to topics that directly impacted rehospitalization (signs and symptoms, medications, and diet), while patients demonstrated a greater desire to learn about the underlying processes of HF (identity,
Lack of accurate knowledge about the attributes of a HF representation could impact patients’ perceived risk (threat and danger responses) and their selection and execution of responses to illness information (emotional reactions and coping responses) (Shifren, 2003). Patients’ coping responses, in turn, could influence perceptions of self-efficacy to carry out and adhere to recommended treatment strategies.

Finally, perception of a patient’s health state may influence illness beliefs and predict self-care behaviors. In a study of self-care behaviors in patients with HF, patients who perceived they had a poorer health state (using a 1-item self-assessment measure) were more likely to ask for help when short of breath and were more careful about monitoring their fluid intake (Artinian et al., 2002). In this study, the relationship between dyspnea and other symptoms that reflect functional status and patients’ subsequent self-care behaviors provided indirect evidence that HF identity beliefs influenced the patients’ perceptions of risk and threat and promoted self-care.

With the exception of Horowitz et al. (2004), in the studies reported above, researchers did not use the Common Sense Model of Illness Representation theoretical framework as the framework upon which their studies were based or as an explanatory model in the discussion of results. Yet, there was a consistent theme of patient uncertainty in knowledge of HF and a desire to understand HF illness better, especially identity, timeline, and consequences attributes of HF. These research findings imply that illness knowledge and the heightened threat associated with that knowledge might provide a foundation that helps patients understand the need for specific HF medical therapies and self-care management. Further, illness knowledge that is perceived as
threatening to health might strengthen perceptions of self-efficacy for self-care behavior, thus, promoting self-care adherence.

In summary, patients with HF may not receive specific, detailed information about what HF is, the population risk (prognosis), and what they can do to increase their control over the course of their condition. It is unknown if accurate information of HF representation attributes leads to revised cognitive images of HF as an illness threat that strengthen perceived self-efficacy for behaviors, facilitate self-care behaviors and could actually be health protective.

*HF representation based on objective cues of HF severity.* In addition to conceptual information processing to construct a HF representation, perceptual information or objective cues are processed to give HF meaning. Literature on the Common Sense Model of Illness Representation focused on sensations and symptoms as objective cues. However, in this dissertation, objective cues will be broadened to include more than just sensations and symptoms. Functional capacity (defined as the level of ability to carry out activities of daily living) is an example of an objective cue based on symptoms. In HF, New York Heart Association (NYHA) functional status is a term used to determine when symptoms of dyspnea, fatigue, palpitations, and chest pain impair a patient’s ability to carry out activities of daily living. NYHA functional class is a subjective, but universally accepted measurement on an escalating scale of I-IV, with I equal to no functional impairment and IV equal to symptoms at rest causing complete or near complete inability to carry out activities. The NYHA functional status classification is consistently used in contemporary HF medical research since the Veterans Affairs Vasodilator-Heart Failure Trials (V-HeFT I and V-HeFT II) (Cohn, 1994) to describe a
sample or differentiate outcomes between groups. In this dissertation, NYHA functional status will be used as one of five objective cues. The other four cues are type of physician practice treating the patient’s HF, recent HF hospitalization, recent or current participation in a HF research study, and evaluation or enlistment for cardiac transplantation. All five situations are used as measures of objective cues of HF severity since they reflect a level of HF severity and have the potential to affect processing of attribute information that make up a HF representation.

Specifically in this study, it was suggested that objective cues may guide patient perceptions about the illness threat associated with their HF representation, directly or indirectly. All of the objective cues used in this study were implicit to the identity attribute of HF representation, but created meaning in other attributes of HF representation, e.g., recent hospitalization provides an objective cue of the timeline and consequence attributes, type of physician practice provides a cue in the consequences and control attributes, cardiac transplantation evaluation or enlistment provides a cue of the consequences attribute, and participation in a HF research study provides a cue of the control attribute of HF representation.

The literature does not provide direct evidence of an association between objective cues of a HF representation and perceptions of diet self-efficacy. There is little direct evidence of an association between the number of objective cues as described in this study and the traditional perceptual information (symptoms and sensations) discussed in the identity attribute of the Common Sense Model. However, variables interpreted to be objective cues, e.g., hospitalizations, physician specialty (Ni et al., 1999), and symptom severity (Rockwell & Riegel, 2001), were associated with self-care. The
following review of objective cues provides evidence of their impact on quality of life and morbidity; the ultimate endpoints presumed to be improved when patients adhere to a low sodium diet. Linkage to the Common Sense Model and clinical patient outcomes is reported and discussed.

Objective cues of HF severity are signals that may be construed or interpreted by patients as a worsening HF status or prognosis. More intense symptoms or greater frequency of other objective cues may be interpreted as a threat to health. Objective cues influence HF representation because the experiences associated with these cues alter cognitive thoughts and images of the meaning of HF. However, objective cues of HF severity do not directly describe or help patient’s understand the silent processes of HF or the population risk of HF; and, as such, their interpretation by patients is variable. Number of objective cues likely reflects increased morbidity and mortality and thus, having many simultaneous objective cues of HF severity may heighten patients’ thoughts about the dangerous threat of HF. A heightened threat may then promote coping through strengthened diet self-efficacy, even if HF illness beliefs reflect inaccurate information.

Many objective cues of HF severity are those that reflect advanced HF status and management. Referral to a cardiologist whose sole practice is related to treating HF, participation in a HF research study, and evaluation or enlistment for cardiac transplantation are examples of intense management strategies reserved for patients with advanced HF. Each management strategy requires thorough patient reassessment, education, intensive monitoring, and follow-up. Essentially, the health care team is more vigilant and patients may receive accurate information about HF illness attributes that are new to them. The increased vigilance may act as stimuli for patient reassessment of their
HF representation and promote new coping responses and behaviors. Physicians specializing in HF are more likely to provide care based on consensus guidelines and national quality benchmarks that include patient education and adherence monitoring of self-care behaviors (Ansari, Alexandar, Tutar, Bello, & Massie, 2003; De Geest et al., 2003; Indridason, Coffman, & Oddone, 2003; Khunti, Hearnshaw, Baker, & Grimshaw, 2002). Physician specialty has been associated with survival (Indridason et al.) and cardiovascular death and hospitalization (Ansari et al.); however, it is unknown if physician type affects illness threat and leads to adaptive coping.

Hospitalizations are used as research indicators for cost and morbidity; however, patients may interpret recent hospitalizations as a setback or a worsening of status. Therefore, hospitalization is also a timeline and consequences attribute of HF representation. Although hospitalization is a temporary state, it may be a stimulus that promotes a change of lifestyle. Finally, prior to hospital discharge for HF decompensation, patients receive discharge instructions that may include new or additional information about HF illness attributes that could alter their HF representation.

Symptoms associated with functional status in HF are fatigue, dyspnea, and palpitations. Functional status classification represents exercise capacity and has been found to predict long-term mortality and HF hospitalization (Shah et al., 2001). Assessing NYHA functional status was found to be the sole predictor of survival when multivariate analysis was performed on nine variables (Beniaminovitz, Aaronson, & Mancini, 1998) and is frequently used in retrospective chart reviews. Many patients are in tune with their body sensations and can recognize symptom and functional status changes, even if they do not correctly interpret the functional changes conceptually as a change in HF status.
Thus, symptoms signaling worsening of functional status may directly or indirectly alter processing of the threat of HF and may promote an alteration in coping plans. In so doing, patients might alter coping actions associated with self-care behaviors.

Objective cues of HF severity can be independent of conceptual HF illness beliefs. They must be assessed separately to learn of their impact on HF representation analysis and interpretation. Patients treated by cardiologists and HF specialty cardiologists, with poor functional capacity, who have recently been hospitalized for HF decompensation and/or participated in research studies, or who have been evaluated or enlisted for cardiac transplantation may have a heightened intuitive awareness of their prognosis and condition severity. Likewise, patients who are asymptomatic or have stable mild to moderate symptoms may believe their HF is temporarily or permanently gone and may not interpret HF as a threat or danger. Patients with a HF representation shaped by number of objective cues might cultivate intrinsic interest in perceptions of diet self-efficacy for self-care. Investigating both aspects of illness threat (accuracy of illness beliefs and level of objective cues of HF severity) quantitatively within the context of one study provides the opportunity to determine the strength of each in predicting perceived diet self-efficacy. If found to be a strong predictor of perceived diet self-efficacy, these objective cues can be incorporated in assessment, action planning, and evaluation components of patient education programs. Establishing whether objective cues of HF severity, as part of a HF representation, impacts coping responses that strengthen perceived diet self-efficacy is a starting point.
Depression as an Emotional Reaction to HF Threat and HF Representation

The Common Sense Model of Illness Representation theoretical framework conceptualizes people with an illness as problem solvers who use two parallel processes, cognitive and emotional, to interpret and deal with HF representation information (Diefenbach & Leventhal, 1996). On the emotional level, patients process emotional reactions to the illness information itself and the illness threat or danger that was derived from the illness representation. The emotional response elicited, e.g., feelings of depression, anger, or annoyance, prompt coping actions to reduce the feeling state and the simultaneously activated representation to the illness (Diefenbach & Leventhal). In HF, using the Common Sense Model to determine if HF representation predicts perceptions of diet self-efficacy is a good match since patients with HF have a high incidence of depression and also have other emotional burdens, especially anger, anxiety, fear, and uncertainty.

Researchers who performed qualitative studies to learn patients’ perceptions of health and meaning of HF found prevalent emotional themes. In one study, fear of death and feelings of hopelessness were prominent (Evangelista, Kagawa-Singer, & Dracup, 2001). In male patients with HF, ‘feeling resignation’ was one of six themes that emerged (Mårtensson, Karlsson, & Fridlund, 1997). In another study of 20 male patients with moderate HF, consequences of illness were physical, emotional, cognitive, social, and vocational (Europe & Tyni-Lenné, 2004). Emotional consequences changed gradually over time as patients lived with HF. Early emotions were fear, anxiety, and nervousness. Later, patients experienced agony, depression, and increased irritation with physical inabilities (Europe & Tyni-Lenné). Europe and Tyni-Lenné found that depression was a
specific emotional response in male patients. In their study, one-quarter had thoughts about death that were associated with the consequences attribute of implicit HF illness beliefs. Specifically, thoughts that HF was a fatal condition and that HF provides little future due to poor prognosis led to maladaptive emotional responses. In addition, fears of death were prompted by sensations of dyspnea (Europe & Tyni-Lenné). Thus, there may be other linkages between truly understanding HF, promoting positive meaning of the illness experience, and depression.

Positive and negative fears and feelings about death and the future could be intensified or modulated by attributes of HF representation. Qualitative researchers found themes associated with depression when they sought to learn patients’ meaning of HF. The presence of depression in studies of HF meaning heightens the need to study this emotion in context of the Common Sense Model of Illness Representation framework. By doing so, new knowledge will be uncovered about depression as an emotional response to HF representation stimuli and the effect of depression on coping. In this study, it is hypothesized that depression is inversely related to perceptions of diet self-efficacy.

Depression, HF, and cardiovascular disease. A strong association exists between cardiovascular disease and depression, and is particularly strong for patients with HF. In studies of ambulatory patients with HF, the prevalence of depression was high. For example, in one small study of 33 ambulatory elderly HF patients in an exercise regimen, 42% had significant elevation of depression scores. In depressed patients, there was a trend toward diminished physical ability and greater functional impairment, but energy expenditure (measured as maximal oxygen consumption during peak exercise) was not different between depressed and non-depressed patients (Skotzko et al., 2000). In another
study of 460 patients with HF, Rumsfeld et al. (2003) found that 30% had significant depressive symptoms. Depression was associated with worsening of HF symptoms, worsening physical and social functioning, and a decline in quality of life (Rumsfeld et al).

The literature also indicates there is a high prevalence of depression in patients when hospitalized. In patients hospitalized for decompensated HF, the prevalence of minor, moderate, and major depression was 21.5-34%, 35%, and 9-36.5%, respectively (Jiang et al., 2001; Koenig, 1998; Rozzini, Sabatini, Frisoni, & Trabucchi, 2002; Vaccarino, Kasl, Abramson, & Krumholz, 2001). The risk of depression with HF was nearly six times that of patients who did not have HF, even after regression analysis (Rozzini et al.). Depressed patients were more than twice as likely to die within a six month to one-year period and were readmitted to a hospital with significantly greater frequency at 6 months or one-year after assessment when compared to patients with similar disease who were not depressed (Jiang et al.; Rozzini et al.; Vaccarino et al.). Consistent with ambulatory patients, hospitalized patients with HF and depression were more likely to have functional impairment in carrying out daily activities (Koenig; Rozzini et al.).

Functional impairment and rehospitalization were common outcomes of depressed patients with HF. These findings might be due to an association between depression and perceived self-efficacy for specific self-care behaviors, especially since most studies did not find an association between depression and a patient’s demographic (sex, age), socioeconomic characteristics, or HF severity (ejection fraction and functional class) (Skotzko et al., 2000). The high prevalence of depression among patients with HF
supports examination of depression and perceived diet self-efficacy to determine if the former predicts the latter. Findings would make an important contribution to knowledge. If depression predicts diet self-efficacy, implications could be used to build a foundation for future research interventions that utilize concepts from the Common Sense Model in conceptual HF educational information and self-care planning and interventions.

**Depression and illness representation.** Four studies in the literature provided an association between depression and a person’s illness representation. First, in their study to determine if physical symptoms and functioning predicted depression in patients with HF, Friedman and Griffin (2001) found that both physical symptoms and functioning influenced a diagnosis of depression. The presence of physical symptoms contributed 13% and physical functioning contributed only 2% to the variance in depression. Study results could be interpreted to mean that physical symptoms and sensations of a HF representation led to a constructed meaning of danger or threat that produced an emotional reaction of depression. The coping response to the heightened threat of HF and the associated depression was to limit activities and reduce physical functioning. In this study, physical symptoms that affect daily functioning are a part of the identity attribute of HF representation. In a second study of patients with chronic HF treated in a cardiovascular clinic in Taiwan, functional status was significantly associated with depression (Tsay & Chao, 2002). Patients who had strengthened self-efficacy for general HF management had improved functional status and less depression (Tao & Chao). Thus, perceived self-efficacy may play a role in helping to maintain adaptive physical and emotional responses to HF. In this study, the outcome variable was depression. It is unknown if an inverse relationship exists, that is, if depression predicts self-efficacy.
In a third study, interviews of 200 terminally ill cancer patients determined prognostic awareness. Two interesting findings were that hopelessness was not significantly associated with prognostic awareness, and that depression was nearly three times greater among patients who did not acknowledge their prognosis when compared to those with partial or full acknowledgement (Chochinov, Tataryn, Wilson, Enns, & Lander, 2000). Multivariate regression indicated that depression continued to significantly account for prognostic denial, and that reduced prognostic awareness in depressed patients was associated with intense family contact. Researchers concluded that family members might adopt a position of prognostic denial when they know the patient is deeply distressed and in denial. Study results could be interpreted to mean that depression was more common in patients who did not have an accurate illness representation. Patients might have had symptoms or other objective cues of cancer threat, but when they (and their families) denied the seriousness of cancer or its prognosis, depression was evoked as the emotional response. Prognosis information is a consequences attribute of an illness representation.

Finally, in a fourth study, researchers studied the relationship of Common Sense Model of Illness Representation and outcomes in patients with multiple sclerosis. In 99 participants, higher levels of depression were associated with perceptions of strong illness identity, more serious consequences, acute timeline, and low control (Vaughan, Morrison, & Miller, 2003). Many of these findings could apply to patients with HF as well. When patients accurately identify what HF means, including background and symptoms, and also believe they have a poor prognosis and low self-control, they might be particularly vulnerable to depression.
In summary, it is unknown if an accurate HF representation that incorporates all four attributes (identity, timeline, consequences, and cure/control) would elicit healthy emotional reactions and generate coping behaviors that decrease the HF threat, rather than causing depression, which has been associated with decreased physical functioning. It is important to learn if there is a relationship between depression, the strength of perceived diet self-efficacy, and the direction of this relationship. Using the Common Sense Model of Illness Representation framework provides an opportunity to discern a relationship between depression and perceptions of diet self-efficacy simultaneously with HF representation concepts thought to predict diet self-efficacy. The results of this study could provide a valuable contribution to nursing science and would impact future studies in this program of research.

Control Variables

In this study, demographic and socioeconomic variables to be controlled are age, race, gender, socioeconomic status (someone to confide in and level of comfort living on family income), marital status, and education level. History of medical conditions known to mimic symptoms of HF were controlled, specifically, medically managed diabetes mellitus, asthma, chronic obstructive pulmonary disease (COPD), and atrial fibrillation. Heart failure increases with age in both genders, but systolic dysfunction is more closely aligned with men and HF with preserved left ventricular systolic function is more closely aligned with women (Acute Decompensated Heart Failure National Registry (ADHERE), 2004). Thus, while overall prevalence of HF is similar for men and women, age, gender, and other control variables listed above could affect the impact of predictor variables on perceived diet self-efficacy.
In one study of illness representation on diet by Coutu et al. (2003), researchers studied the influence of control variables on outcomes. In a prospective study of the influence of patients’ baseline illness representation of hypercholesterolemia on long term (over 1 year) dietary modification adherence, researchers controlled for the following biopsychosocial variables in 208 patients: age, education, gender, income, hours of physical activity, body mass index, social support, depression, hostility, subjective stress, medication adherence, and length of time on a lipid-lowering drug. Of these, only body mass index was associated with change in food record rating (dietary improvement) at one year (Coutu et al.). These results suggest that the effects of illness representation on diet behavior may be independent of demographic and other control variables.

Social isolation (not having someone to confide in) was a predictor of functional status (activities of daily living) impairment in patients with an ejection fraction of 35% or less and was associated with an unmarried state or receiving less than one visit per month from family or friends (Clarke, Frasure-Smith, Lespérance, & Bourassa, 2000). In another study, social isolation was associated with fatal and non-fatal cardiovascular events in women in the year after a hospital admission (Krumholz et al., 1998). In a third study, socially isolated patients with HF had more rehospitalization that was independent of HF severity (Struthers, Anderson, Donnan, & MacDonald, 2000). Since social isolation was associated with functional status and activity, it might be an important variable in another self-care behavior, low sodium diet.

In studies of self-care in HF, the influence of demographic, economic, and medical history variables on outcomes was limited. Rockwell and Riegel (2001) assessed
demographic, socioeconomic, and medical history characteristics as predictors of self-care in 209 elderly patients with HF. Specific predictor variables studied were gender, socioeconomic status, age, education level, marital status, level of social support, current income level, and comorbidity (by category, based on the number of comorbid conditions). In this adequately powered study, multiple regression analysis found that the model had one significant demographic variable: educational level, which contributed 4.6% of the variance for self-care. In total, the model (which included symptoms severity, an identity attribute of HF representation, in addition to others listed above) accounted for only 10.3% of the variance in self-care (Rockwell & Riegel).

In a study assessing factors that influenced knowledge of and adherence to self-care in 113 patients with HF, the following patient characteristics were measured to determine their influence on outcomes: smoking, drinking, marital status, living alone, highest education completed, race and social support. In this study, only two demographic variables influenced outcomes. Gender significantly influenced knowledge of self-care and marital status influenced adherence to self-care recommendations (Ni et al., 1999).

Controlling for potentially relevant demographic, socioeconomic, and medical history factors will provide a clearer understanding of the effect of predictor variables of the Common Sense Model on perceived low sodium diet self-efficacy. Since demographic, socioeconomic, and medical history variables were not strong predictors of self-care adherence in patients with hypercholesterolemia or HF, it is important to conduct further research of predictors of self-care (or perceived self-efficacy for self-care) so that self-care adherence can be enhanced.
Summary

The present study examines three predictors of perceived self-efficacy for diet behaviors: 1) cognitive, conceptual illness threat, based on the accuracy of patient’s HF illness beliefs, 2) cognitive, perceptual illness threat, based on the number of objective cues of HF severity and 3) depression as an emotional response to HF representation illness threat, while controlling for demographic, socioeconomic, and medical history factors that might influence perceived diet self-efficacy. The present study has six objectives, stated as hypotheses. The first objective is to determine if accurate HF illness beliefs are associated with strengthened perceived diet self-efficacy. The second objective is to determine if a higher number of objective cues of HF severity are associated with strengthened perceived diet self-efficacy. The third objective is to determine if patients with accurate HF illness beliefs who are asymptomatic or have mild HF (defined as functional status I or II HF) have strengthened perceived diet self-efficacy. The fourth objective is to determine if depression is associated with weakened perceived diet self-efficacy. The fifth objective is to determine if HF illness beliefs, objective cues of HF, and depression together explain a statistically significant amount of variance for perceived diet self-efficacy. These objectives are based on the Common Sense Model of Illness theoretical framework and will provide evidence of the strength of illness representation threat and depression on a known precursor to diet behavior, namely, perceived diet self-efficacy. The final objective will determine if the relationships above hold when controlling for demographic, socioeconomic, and medical history factors in patients with HF.
Promotion of self-care behaviors is an important aspect of nursing care in HF (and other chronic conditions). This study is needed for four reasons. First, nurse researchers have used the Common Sense Model of Illness Representation theoretical framework in post myocardial and coronary artery bypass patients and found it to be an important model of behavior promotion (Cherrington, Moser, Lennie, & Kennedy, 2004; Gump et al., 2001; Petrie, Weinman, Sharpe, & Buckley, 1996; Weinman, Petrie, Sharpe, & Walker, 2000) but it has not been studied as a model of behavior promotion in patients with HF, a chronic cardiac condition. Second, nursing science lacks information on HF representation threat and emotional responses to HF threat as predictors of perceived diet self-efficacy, even though the literature provides evidence that these concepts are associated with self-care. This study will fill gaps in knowledge. Third, empirical knowledge about the silent processes of HF pathophysiology gives rise to study patient perceptions of the threat associated with asymptomatic HF to determine the need for new content in education programs that aim to promote behavior adherence. This study provides the first phase of research that could make a valuable contribution to nursing science since nurses are the primary educators of patients. Fourth, there is empirical evidence that diet adherence is lacking and is directly related to morbidity and quality of life issues. This knowledge gives rise to the need to learn more about predictors of diet adherence.

Heart failure is a devastating condition that continues to grow in prevalence and incidence. Newer pharmacologic therapies have only made a slight impact on HF prognosis and hospital admissions. In addition, adherence to self-care behaviors is known to be suboptimal. This program of research has the potential to redirect the therapeutic
plan of care from current pharmacologic therapies as the mainstay of medical management to a combination of pharmacologic and self-care strategies as a dual and equal focus that is funded by health insurers, facilitated by health care providers, and monitored through national and local quality improvement programs.
Chapter III. Methods

This chapter provides details of the population, sampling criteria, instruments, and data collection procedures used in the present study. The statistical analysis plan is presented and human subjects protection is described.

This predictive, correlational, one-group design uses a stratified random sample to determine if three illness threat variables derived from the Common Sense Model of Illness Representation theoretical framework, (a) accuracy of heart failure (HF) illness beliefs, (b) objective cues of HF severity, and (c) depression predict perceived diet self-efficacy in patients with HF. Questionnaires were administered one time as a self-report to collect data. In addition, the principal investigator collected data from the patient’s medical record to obtain the number of objective cues of HF severity that made up a patient’s HF representation and control variables that, in addition to answering a hypothesis, aided in determining the generalizability of the sample in relation to demographics and medical background.

Population

This study was conducted at The Cleveland Clinic Foundation. The Cleveland Clinic Foundation is a 1000+ bed tertiary care, university-based medical facility in downtown Cleveland, Ohio. The Cleveland Clinic Foundation provides a high volume of care to patients of many cultures and varied socioeconomic status and has eight cardiologists who sub-specialize in the treatment of patients with HF and cardiac transplantation.
The target population for this study was adults with chronic systolic HF of moderate to severe status. This included patients who were treated in an ambulatory or inpatient setting for any reason from January 1, 2004 to April 30, 2004 at The Cleveland Clinic Foundation. The principal investigator used broad inclusion criteria to allow for the largest variety of individual sampling characteristics so that patients chosen for the study were similar to the general population. Systolic HF is more common in males (due to higher incidence of myocardial infarction in males) so it was anticipated that there would be more men than women enrolled.

**Sampling Criteria**

Patients met the following inclusion criteria: (a) history of chronic systolic, moderate to severe HF, defined as an ejection fraction of 40% or less, (b) hospitalization or ambulatory visit for any reason in the 4 months preceding study initiation, (c) age 18-90, (d) spoke and understood English, and (e) able to give informed consent, read, and complete survey.

Participants were excluded from enrollment if any of the following criteria applied: (a) cognitive impairment, mental illness (history of delirium, psychosis, Alzheimer’s disease, bipolar disorder or history of depression that precedes onset of cardiac disease by five years or more), or anxiety disorder, (b) uncorrected blindness or hearing loss, (c) no permanent home address or telephone, (d) refusal to give written informed consent, (e) non-resident of the United States, (f) renal failure requiring dialysis that interferes with data collection, and (g) new diagnosis of HF after cardiac transplantation. Rationale for exclusions is multifactorial. Patients with impaired cognition, psychosis, anxiety disorder or long-standing depression cannot be expected to
have full comprehension to complete surveys; whether due to their disease process or pharmacologic therapies for their cognitive condition. Patients with HF who were depressed prior to their cardiac condition may have altered their general level of self-care and self-efficacy for self-care behaviors prior to their HF diagnosis. Patients requiring chronic dialysis may have electrolyte abnormalities that minimize full comprehension. Dialysis patients are away from their home three days a week for treatment and may not be available for this study. Prior to a cardiac transplantation, patients typically experience severe symptoms. This is followed by normal heart function post transplant. These experiences provide cardiac transplant patients with a unique perspective of HF cues, seriousness, and threat not experienced by most patients. Methods used to exclude patients who were ineligible for participation are discussed in the data collection section.

A power analysis was conducted using SamplePower 1.0 (SPSS program) for the likelihood of detecting a nonzero sample correlation given a 0.2 population correlation and a significance level (alpha) of 0.05 on a two-tailed test. Analysis was performed using one-tailed tests of significance; however, a two-tailed test was used in power analysis as a conservative way to be sure the sample was adequate. The 0.2 population correlation was conservative given the 0.4-0.5 correlations observed in some studies of the Common Sense Model of Illness Representation and self-efficacy. Heart failure threat is not established merely by assessing symptoms and sensations, as in many other chronic conditions. A conservative effect size allows for broader sampling of the population. As this is the first study to link these concepts to derive associations, a smaller effect size reduces the risk of a type II error. Power analysis yielded a sample of N = 190 for a power of 0.80. Therefore, a sample size of 192 participants allows participants to be
stratified into three equal groups (64 participants per group) based on type of physician practice.

Two published correlational studies of illness representations in patients with chronic diseases provided evidence that the sample size was adequate. In patients with osteoarthritis, 60 participants were adequate to determine that beliefs about the seriousness of osteoarthritis were associated with self-management ($R = .48; p < 0.001$ on typical days and $R = .53; p < 0.001$ on worse days) (Hampson, Glasgow, & Zeiss, 1994). In 208 hypercholesterolemic patients, researchers demonstrated an association between accurate illness representation at baseline and improved dietary habits at one year ($R = .19; p = 0.043$) and reduction in perception of stress and symptoms and reduced fat intake ($R = .41; p = 0.005$) (Coutu et al., 2003).

In studies of depression in patients with HF, sample sizes ranged from 33 to 391 patients. There were no reports that studied the relationship of depression to perceived diet self-efficacy or any self-care behaviors in patients with HF, however, in one report of 100 patients, self-efficacy for HF management had an strong inverse relationship to depression (bivariate correlation: $r = -.61, p < 0.001$; path analysis direct negative effect: $+.72, p < 0.001$) (Tsay & Chao, 2002). In another study with a sample size of 170 subjects, researchers assessed the relationship of physical symptoms and functioning to depression and found that depression was related to both, but more strongly related to symptoms ($r = .19-.48$) (Friedman & Griffin, 2001).

**Instruments**

Conceptually, this study measured the association of HF representation threat and the emotional response to HF threat to perceived low sodium diet self-efficacy while
controlling for demographic, socioeconomic, and medical history information.

Operationally, HF representation threat was measured by assessing patients’ accuracy of illness beliefs and level of objective cues of HF severity. Emotional response to HF threat was measured by studying level of depression.

Participants completed a total of six tools, two of which contained demographic, socioeconomic, and medical history information. Surveys were stapled together as one questionnaire (booklet) and were presented to participants in the following order: *Medical Background Survey* [Appendix B], *Survey of Illness Beliefs in HF* [Appendix C], *Activity Scale* [Appendix D], *The Low Sodium Eating Behaviors Scale* [Appendix E], *Nine Symptom Checklist* [Appendix F], and *To Help Us Understand You Survey* [Appendix G]. Participants received copies of the questionnaire by mail, even when plans were made to complete the surveys by telephone contact. In this way, all participants were able to visualize questions and statements.

Random order effects were not used because the researcher contacted some subjects by telephone to complete questionnaires. In planning for telephone survey completion, each survey was numbered so subjects could follow along (using their paper copy of the questionnaire) while answering questions. Survey order was chosen to mix short and long forms, to make the depression survey the last non-control variable assessed, and to make socioeconomic questions the final questions to be asked. With this setup, subjects completing questionnaires by telephone could discuss feelings, as needed.

Medical history information was collected by electronic medical record review and documented on the Medical History Chart Review Form (Appendix H). Data collection included HF etiology, left ventricular ejection fraction percent, type of test
performed to determine ejection fraction, history of medical conditions used as control variables (medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation), other medical history common to elderly people, history of cardiac transplantation evaluation or enlistment, and history of recent participation in a HF research study. All medical history information collected was used to describe the sample. Only medical history control variables were used in study analyses.

Demographic data were collected and recorded to provide characteristics of the sample and discussion of generalizability of findings: length of time with HF, smoking and alcohol history, general health rating, activity and exercise level, height, weight (above data on Appendix B), difficulty in working, getting along with people or taking care of things at home if bothered by symptoms associated with depression (question 10 on Appendix F), work status, and family income (Appendix G). All other data was used to answer research hypotheses.

Details of the method of study for each variable, as depicted in Figure 4, is presented below. The review begins with the outcome variable, perceived low sodium diet self efficacy, then discusses predictor and control variables.

*The Low Sodium Eating Behaviors Scale*

*The Low Sodium Eating Behaviors Scale* of the Self-Efficacy for Eating Behaviors Scale (Sallis, Pinski, Grossman, Patterson, & Nader, 1988) uses a 5-point Likert scale (*sure I could not do it* [1] to *sure I could do it* [5]) plus a *does not apply* option) to determine perception of health-related eating behaviors. The tool has 61 items, of which 29 are general diet or specific low-sodium diet statements. Factor analysis revealed that the tool consisted of 5 factors, accounting for 44% of the variance. All
factors had eigenvalues > 2.0. Cronbach’s alpha coefficients ranged from 0.85-0.93 for the five factors; the reducing salt factor had a coefficient alpha of 0.86. Concurrent criterion-related validity testing revealed that each scale factor was significantly correlated with a 24-hour diet recall interview of fat and sodium intake in college students ($p<0.001$). There were no reports in the literature that tested this instrument in patients with HF. However, the items were simply written, had a global perspective and applied to patients that self-managed their lifestyle, no matter the health condition or health status. For this study, only the 29 items that applied to overall and low-sodium diet were used. Three of the five factors applied to the 29 items: resisting relapse (14 items), reducing salt (9 items) and behavioral skills (6 items). Scoring of the 29 items was based on mean score of all 29 items and mean score of each of the three factors assessed by this tool (Appendix A); excluding missing data and items that were marked not applicable. Higher mean total score and score in each factor reflected a stronger perceived low sodium diet self-efficacy. In this study, the Cronbach’s alpha for the 29-item tool was 0.958. The Cronbach’s alphas for each of the three factors were: resisting relapse, 0.944; reducing salt, 0.871 and behavioral skills, 0.801.

**Survey of Illness Beliefs in Heart Failure**

The principal investigator developed the *Survey of Illness Beliefs in HF* in 2003. This tool was specifically designed to measure the accuracy of patients’ illness beliefs of HF using the Common Sense Model of Illness framework. The *Survey of Illness Beliefs in HF* contains 14 items of accurate and inaccurate common sense illness beliefs about HF that were derived from four attributes of HF representation. Two items encompass consequences and a second attribute of HF representation; the other 12 items each
encompass one attribute of HF representation. Overall, there are four identity items, three timeline items, five consequences items, and four control items. The tool uses a 4-point Likert scale (strongly disagree to strongly agree) to determine the accuracy of HF illness beliefs and level of certainty patients have for their beliefs. A mean score equal to or greater than 3.0 reflects accurate illness beliefs. A mean score of the seven accurately and inaccurately worded illness belief items provides evidence of holistic and episodic illness belief accuracy (as described below). Patient certainty for HF beliefs was reflected in the deviation of mean scores from 3.0, on a scale of 1-4. Scores closer to 2.0 and 4.0 reflected greater uncertainty or certainty in illness beliefs, respectively.

Tool development included a process to ensure content validity (Appendix I). The principal investigator conducted a pilot study in May 2003 to study tool reliability (Appendix J). Cronbach’s alpha of the responses of 104 patients for the 14-item tool was 0.73. Exploratory factor analysis was conducted to assure that there were 2 levels of the concept illness beliefs, accurate and inaccurate, labeled ‘holistic’ and ‘episodic’ (α = .87 and .71, respectively). Both illness belief levels had eigenvalues > 1.0 and together they accounted for 48.3% of the variance in the correlation matrix. The holistic level was strongly defined by 7 items in all 4 attributes of HF representation. This level included items that represented a realistic, accurate view of HF (occurs silently, is a chronic threat to health, is disabling, can shorten life, needs treatment even when feeling fine, can get worse by lifestyle and actions, and plan of care must be followed forever). The episodic level was strongly defined by seven items in all four attributes of HF representation, but characterized a perspective of HF as a curable condition, something that comes and goes (as symptoms wax and wane), is treated mainly with drugs, is not influenced by behavior,
is present only when symptoms are present, may improve over time, and requires lots of fluids. Items in the episodic level are typical of other chronic medical conditions (arthritis, asthma, and COPD) but are inaccurate in HF.

To assess construct validity of the *Survey of Illness Beliefs in HF* during reliability testing, the principal investigator collected data on two variables: current participation in a medical research study and evaluation or enlistment for cardiac transplant. Theoretically, patients with either characteristic should have had higher accuracy in HF illness beliefs since they had more advanced HF and more opportunities to learn about their illness and develop accurate HF illness beliefs. In 104 patients studied, those in research studies and those evaluated or listed for cardiac transplantation had significantly higher mean illness beliefs scores ($p = 0.02$ and $0.008$, respectively). A more detailed report of results from the pilot study of instrument reliability is found in Appendix J. In this study, the Cronbach’s alpha was 0.71.

**Objective Cues of HF Severity**

Objective cues data were collected from multiple sources. Type of physician practice (1 = internal medicine or other non-cardiologist physician, 2 = cardiologist, and 3 = HF specialty cardiologist) was obtained from the billing system (part of initial search for potential participants). Hospitalization in the last 30 days was assessed by patient response to direct questioning (1 = yes and 0 = no) on the *Medical Background Survey*. Participation in a HF research study (2 = yes and 0 = no) and cardiac transplantation evaluation or enlistment (3 = yes and 0 = no) were collected from medical record review and recorded on the *Medical History Chart Review Form*. The *Activity Scale* (score range
of 1-4 is equal to four New York Heart Association (NYHA) functional status
classifications) was used to determine NYHA functional status.

Scores from each of the five objective cues were totaled to determine the number
of objective cues of HF illness threat, based on contemporary evidence about situational
objective cues associated with advanced HF. Yes values for the three variables assigned a
yes or a no score were weighted so that scores reflected different levels of perceived
threat, based on contemporary medical and nursing evidence. Cardiac transplantation
evaluation or enlistment had the highest score (3) to correspond to the greatest likelihood
of illness threat and worsened heart function. Participation in a HF research study scored
a 2, and recent hospitalization for HF decompensation scored a 1, reflecting less weight
in determining objective cues. The range of possible scores for the five objective cues
items was 2 to 13. A lower total score reflected a decreased number of objective cues of
HF severity. The sum score was used to determine the relationship of objective cues of
illness threat to perceived low sodium diet self-efficacy.

To determine the validity of the weighted objective cues scores assigned to recent
hospitalization, recent participation in a HF research study, and cardiac transplantation
evaluation or enlistment, six Cleveland Clinic Foundation master and bachelor prepared
RN’s who were clinical nurse experts in HF management provided feedback. Each was
asked to weigh the three variables as individual measures of HF severity; then each was
asked to weigh the three variables again after receiving explanations about the rationale
behind weights assigned by the investigator. In the first exercise, all six agreed that
cardiac transplantation evaluation or enlistment was the strongest objective cue and four
of six RN’s agreed that recent participation in a research study had more weight than
recent hospitalization; however, two RN’s weighed recent hospitalization equal to recent participation in a HF research study. After receiving investigator interpretation of weights, all six RN’s agreed that cardiac transplantation evaluation or enlistment was the strongest measure of HF severity, followed by recent participation in a research study. Five of 6 RN’s felt that recent hospitalization was the weakest measure of HF severity; only 1 RN felt it carried equal weight as recent participation in a research study.

*Activity scale.* Functional status reflects the level of self-reported limitations in carrying out activities of daily living due to symptoms (fatigue, shortness of breath, palpitations, or chest pain). Health care providers measure functional status subjectively on a scale of I (symptoms do not limit activities) to IV (symptoms prevent completion of activities and has symptoms when at rest) by asking patients questions about activities and symptoms. Subjective measurement, developed by the NYHA in the 1960s, was criticized as having poor interrater reliability (Bennett, Riegel, Bittner, & Nichols, 2002). The *Activity Scale* (labeled *Specific Activity Scale* in the literature) was developed to overcome the reliability issues of functional status measurement (Goldman, Hashimoto, Cook, & Loscalzo, 1981). This standardized interview determines the metabolic costs of specific daily activities on the same I –IV scale as functional status. Patients respond to “yes” or “no” questions. Responses determine how patients move through the form that contains five possible questions. Patients may be asked to stop after the second question (Appendix D). Reproducibility testing showed that functional status agreement between two experienced physician observers was 56%; however, the *Activity Scale* increased reproducibility to 75% agreement (*p* < 0.05) (Goldman, et al.). Validity was demonstrated by comparing results of this measure with exercise test results. In 150 estimates, treadmill
test results were in agreement with functional status criteria 51% of the time, but that increased to 68% when Activity Scale criteria were used ($p < 0.013$) (Goldman, et al.). In this study of 219 patients, Activity Scale score and self-reported level of activity and exercise measured in hours per typical week were correlated ($p = 0.000$).

**Nine Symptom Checklist**

The *Nine Symptom Checklist* (also known as The Patient Health Questionnaire (PHQ)-9), developed by Spitzer, Kroenke, and Williams (1999), is a 9-item measure of depression severity. Items are scored from 0 (*not at all*) to 3 (*nearly every day*), providing a score range of 0-27 and cut points of 5 (mild), 10 (moderate), 15 (moderately-severe) and 20 (severe) to determine the level of depression. In two large studies of internal reliability testing, Cronbach’s alphas were 0.89 and 0.86 (Kroenke, Spitzer & Williams, 2001). Concurrent validity was assured by comparing the *Nine Symptom Checklist* to the 5-item Mental Health Professional Inventory (MHP). The area under the curve for major depression in the *Nine Symptom Checklist* and MHP were 0.95 and 0.93, respectively (Kroenke & Spitzer, 2002). Criterion and construct validity was tested in 6,000 patients in two validation studies that also assessed the tool’s capabilities as a diagnostic and severity measure (Kroenke & Spitzer).

The *Nine Symptom Checklist* was studied as a diagnostic measure, a severity measure, and an outcomes measure. The positive likelihood ratio of major depression occurring when the sum score was greater than 10 was 7:1. As a severity measure, a score of 10 or greater had a sensitivity of 88% and a specificity of 88% for major depression. As an outcomes measure, the *Nine Symptom Checklist* was compared to results from the *Symptom Checklist-20* (SCL-20), a tool used extensively in clinical trials of depression.
treatment in primary care. Results in 150 intervention patients revealed a mean decline in SCL-20 of 0.48, with a corresponding effect size of 0.71. This compared to a mean decline in *Nine Symptom Checklist* of 6.9, with a corresponding effect size of 0.91 (Kroenke & Spitzer, 2002).

The *Nine Symptom Checklist* is short; has concurrent, construct, and criterion validity; can be used as a diagnostic and severity score measure; and has been trialed in primary care patients (rather than patients in a psychiatric setting). Scoring of only the first two questions (range of 0-6) was found to be a valid screening tool to determine major depression in 3,000 primary care patients. The PHQ-2 had sensitivity for major depression of 83%, a specificity of 90%, and a positive likelihood of 2.9 (Kroenke & Spitzer, 2002). In a clinical setting, this short tool is ideal. For this study, the *Nine Symptom Checklist* tool decreased the potential risk of study fatigue while allowing for a delineation of depression severity. The *Nine Symptom Checklist* contains a tenth question that provides information about the level of difficulty participants had in conducting work or home activities and in communicating with others if they had any of the nine symptoms in the previous two weeks. These were analyzed descriptively. The Cronbach’s alpha of the 9-item tool in this study was 0.87. In addition, sum score was correlated with history of depression ($p = 0.004$) and current use of antidepressant medication per medical record review ($p = 0.000$).

For this study, depression that is hypothesized to weaken perceived diet self-efficacy is defined as a sum score of 10 or higher on the *Nine Symptom Checklist* tool. Depression reflects five or more depressive symptoms; such as, trouble concentrating; little interest in activities; sleeping too much or cannot fall asleep; slow speech or fidgety;
thoughts of death; feeling down, depressed or hopeless; tired; poor appetite or overeating, that cause significant impairment in social, occupational or other important areas of functioning. These descriptors are used to define and quantify depression as “depressed mood.”

Control Variables

Control variables are age, race, gender, socioeconomic status (someone to confide in and comfort living on family income), marital status, education level, and medical history of medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation. These variables were measured by multiple methods. Age, race, gender, and marital status data were available from billing sheets. Data was transferred from official documents to a file for transcription into the database created for this study. These demographic variables, that were current at the time of the participant’s most recent visit, were also used to describe the sample and determine generalizability of results.

Both variables of socioeconomic status; someone to confide in and comfort living on family income were measured through the self-administered To Help Us Understand You Survey. In addition, this survey collected data on living with someone, highest education level, health care insurance in addition to Medicare/Medicaid, adequacy of insurance coverage (overall), adequacy that insurance pays for all HF medications, and total family income. Appendix A provides details about specific values for each variable analyzed and scoring.

Medical conditions used as control variables were those known to cause symptoms that could mimic a HF exacerbation. Medically managed diabetes mellitus is common in patients with cardiovascular disease and HF. Consequences of diabetes
mellitus can cause symptoms mimicking HF; for example, neuropathies may decrease exercise tolerance and cause fatigue or dyspnea; subendocardial ischemia can lead to chest pain; changes in glucose level can affect heart rate and may lead to palpitations, especially hypoglycemia; and thirst associated with hyperglycemia may mimic thirst associated with neurohormonal activation in HF. Asthma may cause dyspnea, fatigue, or palpitations as physiological responses to low arterial oxygen level. In COPD, dyspnea and fatigue occur when the supply of oxygenated blood does not meet the demand. Atrial fibrillation can cause all four symptoms of NYHA functional class criteria: dyspnea, fatigue, palpitations, and chest pain, especially when atrioventricular conduction speeds up and causes a rapid ventricular response rate. These variables were collected through chart review by the principal investigator or designee. Designees were registered nurse graduate students from the University of Akron and Ursaline College. History of medical conditions data were assigned a value of 1 = yes and 2 = no.

*Demographic (Non-Control) Variables*

In addition to data collection for control variables, demographic data were collected to describe the sample and discuss generalizability of findings (Table 1).

*Summary of Instruments and Forms*

The six surveys that patients completed contained a total of 75 items. Surveys completed by telephone interview took approximately 20 minutes; however, nurse-patient conversations increased the time to complete surveys for some. Instructions for each tool were simple. Statements were short and patients did not need to write sentences, only circle choices on a Likert or dichotomous scale.
### Table 1

**Demographic Variables**

<table>
<thead>
<tr>
<th>Variable (measurement method)</th>
<th>Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of time with HF (Likert scale options)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>Smoking history ( Likert scale options)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>Alcohol history (Likert scale options)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>General health rating (Likert scale options)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>Activity and exercise level (Likert scale options)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>Height (in feet/inches)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>Weight (in pounds)</td>
<td><em>Medical Background Survey</em></td>
</tr>
<tr>
<td>Difficulty in working, getting along with people or taking care of things at home if bothered by symptoms associated with depression (Likert type scale)</td>
<td><em>Nine Symptom Checklist</em></td>
</tr>
<tr>
<td>Work status (multiple choice options)</td>
<td><em>To Help Us Understand You Survey</em></td>
</tr>
<tr>
<td>Family income (options by income ranges)</td>
<td><em>To Help Us Understand You Survey</em></td>
</tr>
<tr>
<td>Left ventricular ejection fraction (%)</td>
<td><em>Medical History Chart Review Form</em></td>
</tr>
<tr>
<td>Source of data collection for ejection fraction (options)</td>
<td><em>Medical History Chart Review Form</em></td>
</tr>
<tr>
<td>Medical history: cardiovascular, cancer, or conditions commonly seen in HF or with aging; gout, arthritis (yes or no)</td>
<td><em>Medical History Chart Review Form</em></td>
</tr>
</tbody>
</table>

*Note.* HF = heart failure.
Participants were told they could complete all surveys at one time, or they could complete them at their convenience during a two-week period. After informed consent, the principal investigator collected data on medical condition history.

**Data Collection Procedures**

Participants were recruited by obtaining a list from the Cleveland Clinic Foundation billing system of all patients with a primary or secondary diagnosis of HF treated in ambulatory care or in the hospital between January and April 2004. A four-month period was chosen to meet the sample size requirements (as described below). The International Classification Diagnosis (ICD)-9 code 428.0 or the Diagnosis Related Group (DRG) code 127 was used to identify patients.

The query written to recruit potential participants from the billing system contained specific ICD-9 and DRG codes that reflected the following exclusion criteria: cognitive impairment, anxiety disorder or mental illness (except depression); legal blindness and hearing loss without correction; non-resident of United States; no permanent address; renal failure requiring dialysis; and history of cardiac transplantation. The query was written and carried out by billing system experts who routinely perform these functions. The query produced a sample of 4528 patients who had 8443 visits during the four-month period. The billing list provided age, gender, race, and marital status information.

Once the initial list of potentially eligible patients was identified, a search for exclusion criteria that could not be handled by the billing system was completed. The principal investigator obtained ejection fraction percent data from an echocardiography database and removed cases with an ejection fraction of greater than 40%. The list of
potential participants was decreased to 2835 after removing those with diastolic dysfunction and then to 2035 after removing those with no ejection fraction percent in the medical record. When depression was identified in the medical record, onset was determined by assessing documentation of depression, antidepressant drug therapy initiation or physician notes about cause of depression. No patients were excluded due to depression exclusion criteria.

The Social Security Death Index software program was used to remove names of those known to be deceased. Sixty-seven cases were removed, leaving 1956 potential participants for stratification by physician type and randomization.

The remaining 1956 patients were stratified into three groups based on physician type: (a) internal medicine or other non-cardiology physician, (b) cardiologist without subspecialty HF background, and (c) HF specialty cardiologist. When patients were treated by more than one type of physician during the four-month query period, they were assigned to the physician group that reflected the highest level of specialty HF care received. Stratification ensured equivalence in the sample based on physician type; however, analysis was conducted as a one-group design. Figure 5 presents a modified CONsolidated Standards Of Reporting Trials (CONSORT) diagram to provide details about the study sample. After stratification by physician type, a statistician from the Department of Biostatistics and Epidemiology at the Cleveland Clinic Foundation randomly assigned research numbers to patients in each stratum.
Assessed for eligibility (n = 4528 [8443 visits])

Initial Exclusions
- No contact information provided (n = 1)
- Foreign; Not United States address (n = 1)
- Ejection fraction > 40% (n = 1691)
- No ejection data in medical record (n = 812)
- Death (n = 67)

Cases stratified by type of physician practice (n = 1956)
- Internal Medicine and other Non-Cardiologists (n = 563)
- Cardiologist (n = 700)
- Heart Failure Specialty Cardiologists (n = 693)

Randomly assigned a research number for participation (n = 810; 270 in each stratum)

810 letters of invitation to participate mailed; 270 in each stratum

Figure 5. Modified CONSORT diagram of sample.

Note. CONSORT = Consolidated Standards of Reporting Trials.
Figure 5, continued. Modified CONSORT diagram of sample.

Note. CONSORT = Consolidated Standards of Reporting Trials.
Based on an estimated response rate of 30%, 810 letters were mailed to potential participants, 270 from each stratum. The estimated response rate was based on results from a recent study conducted by the principal investigator in which the patient population, methodology of obtaining potential participants, inclusion and exclusion criteria, and methodology of obtaining data (self-administered survey format) were similar.

Eligible participants were mailed an invitation to participate in the study (Appendix K) in September, 2004. The invitation included a description and goals of the study and information to provide full disclosure and protection of human subjects. Topics included in the invitation were the number of survey tools to be completed, time commitment, confidentiality, potential risks and benefits, cost, and voluntary participation. Potential participants were asked if they preferred to have surveys mailed to their homes or to complete information via telephone contact. Potential participants were asked to respond to the invitation in two-weeks by signing (providing written informed consent to participate) and returning page three of the invitation to participate letter in a pre-stamped, pre-addressed envelope that was enclosed for their convenience. Individuals who chose telephone contact were asked to provide a range of daytime hours that was convenient for them to be contacted. During the third week after mailings were delivered, eligible participants that did not respond to the invitation were contacted by phone to determine their willingness to participate. Eligible participants who returned the notice and declined participation were not contacted again.

For those participants who chose to complete surveys by mail, all six surveys were mailed to the participant’s home as one questionnaire (stapled together). A pre-
stamped, pre-addressed envelope was included in the mailing of those who chose to complete the surveys by mail. The questionnaire inside cover page contained a letter (Appendix L, side two) that asked patients to complete the questionnaire within two weeks. After mailing the questionnaire to participants, a 2-week response time began. For those that did not return a survey after 3 weeks, the investigator contacted participants to schedule a time to complete the surveys by phone. At this time, 16 participants requested a second mailing of the survey. The principal investigator’s name and telephone numbers were placed on both the cover letter and the bottom of the last survey to facilitate participant questions and discussion as needed.

For telephone survey completion, the investigator or designee telephoned patients to schedule a time to complete surveys (if patients did not to provide preferences on the consent letter); thus, increasing participant control and convenience in paperwork completion. Surveys were completed in the order that mimicked the order of the stapled questionnaire. A telephone script (Appendix M) was used to ensure consistency in telephone contact and initial communication.

Each survey in the stapled questionnaire had a large typed number (1 – 6) in the upper right corner of the survey form. The survey order was: (1) **Medical Background Survey** - 8 items, (2) **Survey of Illness Beliefs in HF** - 14 items, (3) **Activity Scale** - 5 items, (4) **The Low Sodium Eating Behaviors Scale** - 29 items, (5) **Nine Symptom Checklist** - 10 items and (6) **To Help Us Understand You Survey** - 9 items. Stapling of surveys in a questionnaire, a survey numbering system, and a predefined survey order facilitated smoother transition when communicating on the telephone, including participant discussion of emotions or other potentially distressing topics with the investigator at
survey completion; however very few patients had HF related questions or required
discussion related to topics in the questionnaire.

Data collection ended during the first week of December, 2004. The actual
response rate was 359 patients (44%) and includes those who declined participation and
those who completed surveys. This study involved one participant encounter to collect
data from six surveys and one investigator-generated review of the participant’s
electronic medical record, reviewed via the hospital’s computerized system. When
patients left missing data on mailed surveys, one phone call was made to collect missing
data. Surveys were coded with a participant identifier that was not the patient’s name or
medical record number. The principal investigator maintains a separate file that contains
the participant’s name, medical record number, and research code in a locked office file
cabinet. Completed surveys are maintained in a locked file cabinet of the principal
investigator, but are separate from the file of patient identifier information. Participant
names and medical record numbers were not entered into the database. Signed informed
consent forms were mailed and are maintained in a locked file cabinet in the office of
Associate Dean, Dr. Diana Biordi, Co-dissertation advisor, KSU Henderson Hall, College
of Nursing, Office 214. The Cleveland Clinic Foundation and Kent State University
review boards approved this study in June and August 2004, respectively.

Data were entered into SPSS by the principal investigator or one designee.
Quality monitoring of data collected and entered into the database by the principal
investigator and designees was conducted in two ways. The principal investigator
reviewed all medical record data forms completed by designees. When missing data was
found on the medical record forms, the principal investigator referred back to the
electronic medical record to collect the missing data and performed quality monitoring of all variables on the form at that time. This accounted for approximately 30% of the sample. Second, the principal investigator and 1 registered nurse graduate student randomly selected 45 cases, 15 from each physician stratum (21%) and reviewed data entry of all variables entered into the database. The error rate was less than .05%, reflecting high quality in data collection and computer entry.

Data Analysis

Analyses were performed using the statistical software package SPSS 12.0 for Windows (Chicago, IL). Analyses were completed with consultation of the quantitative methodology expert (Dr. Susan Jones) on the dissertation committee and a statistical programmer from Kent State University. A 0.05 level of significance (one-tailed) was established for all research tests.

Initial analysis included descriptive statistics (including visual scatter plots) for all study variables, descriptive statistics on tool scores, testing of instrument scores for heterogeneity, and Pearson correlation of all variables on each other for multicollinearity. Scores on study instruments displayed an acceptable degree of heterogeneity, normality of distribution, and homoscedasticity for the proposed statistical analysis. Calculation of the Cronbach’s alpha of the 14-item Survey of Illness Beliefs in HF, the 9-item Nine Symptom Checklist (PHQ-9), the 29-item The Low Sodium Eating Behaviors Scale, and each of the three factors of this scale was conducted to establish internal consistency of tools with the study sample.

Standard descriptive statistics were used to describe the demographic and medical history characteristics and the variables of interest (HF illness beliefs, objective cues of
HF severity, depression, and diet self-efficacy). For continuous variables, means, medians, standard deviations and ranges were documented. For categorical variables, frequencies and percentages were produced. Independent and control variables (HF illness beliefs, objective cues of HF severity, depression, perceived diet self-efficacy, age, race, gender, socioeconomic status, marital status, education level, and medical conditions history: e.g., medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation) were categorized into levels when applicable and Pearson Chi-Square test was used to determine if the participant’s response by level of the variable was significantly different for the dependent variable, perceived diet self-efficacy and each factor of diet self-efficacy; resisting relapse, reducing salt, and behavioral skills.

To examine the relationship between HF illness beliefs, objective cues of HF severity, and depression as predictors of perceived diet self-efficacy and whether controlled variables influenced total perceived diet self-efficacy and each of the three factors of perceived diet self-efficacy, Pearson correlation and linear regression analysis were conducted (Table 2 contains analysis methods for each research hypothesis).
Prior to testing hypotheses, the following analyses were conducted:

(a) Descriptive statistics on all study variables to assess for adequate sampling of cells formed by categorical variables

(b) Descriptive statistics on all scores

(c) Scores will each be tested for normality (normal distribution); linear relationship between IV and DV’s; multicollinearity of IV’s to each other

(d) Cronbach’s alpha (reliability in sample) for the Survey of Illness Beliefs in HF, Nine Symptom Checklist, The Low Sodium Eating Behaviors Scale and each of the three factors of the Low Sodium Eating Behaviors Scale: Resisting relapse, reducing salt and behavioral skills.

(e) Survey of Illness Beliefs in HF: Mean score for the 14-item tool.

(f) The Low Sodium Eating Behaviors Scale: Mean total score and mean score for each of 3 factors: (1) resisting relapse, (2) reducing salt, and (3) behavioral skills

<table>
<thead>
<tr>
<th>Research Hypotheses</th>
<th>Instruments Used to Test Hypothesis</th>
<th>Analysis Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV(s) → DV</td>
<td>Refer to Appendix A for scoring</td>
<td></td>
</tr>
<tr>
<td>1. Accuracy of heart failure (HF) illness beliefs → perceived diet self-efficacy</td>
<td>1a. Survey of Illness Beliefs in HF • Mean score of 14 items 1b. The Low Sodium Eating Behaviors Scale • Mean total score (29 items); mean score of each of three factors.</td>
<td>• Pearson correlation of 1a to 1b using a one-tailed test of significance. • Determined the correlation coefficient (r = strength and direction of association) between mean illness beliefs score and mean total and factor scores of perceived diet self-efficacy.</td>
</tr>
<tr>
<td>Research Hypotheses</td>
<td>Instruments Used to Test Hypothesis; Refer to Appendix A for scoring</td>
<td>Analysis Methodology</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
</tbody>
</table>
| 2. Number of objective cues of HF severity → perceived diet self-efficacy | 2a. Physician type, recent HF hospitalization, recent participation in a HF research study, cardiac transplant evaluation or enlistment, and *Activity Scale*  
   • Sum score of all 5 objective cues  
2b. *The Low Sodium Eating Behaviors Scale*  
   • Mean total score (29 items) and mean score of each of three factors. | • Pearson correlation of 2a to 2b using a one-tailed test of significance.  
• Determined the correlation coefficient (r = strength and direction of association) between the standardized sum score of objective cues of HF severity and perceived low sodium diet self-efficacy. |
| 3. In those with asymptomatic or mild HF (functional status I or II by *Activity Scale*), accuracy of HF illness beliefs → perceived diet self-efficacy | 3a. *Survey of Illness Beliefs in HF*  
   • Mean score of 14 items  
3b. *Activity Scale*  
   • Participants with scores of 1-2 are used in analysis.  
3c. *The Low Sodium Eating Behaviors Scale*  
   • Mean total score (29 items) and mean score of each of three factors. | Using data from those with *Activity Scale* scores of 1-2 (see 3b)→  
• Regression coefficient (B) to determine the rate of change in the DV (3c) per unit change in the IV (3a).  
• Note: Analyses are repeated 4 times to determine association of IV’s to 3c  
• Mean total diet self-efficacy  
• Resisting relapse for diet self-efficacy  
• Reducing salt for diet self-efficacy  
• Behavioral skills for diet self-efficacy |
<table>
<thead>
<tr>
<th>Research Hypotheses</th>
<th>Instruments Used to Test Hypothesis</th>
<th>Analysis Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV(s) → DV</td>
<td>Refer to Appendix A for scoring</td>
<td></td>
</tr>
</tbody>
</table>

4a. *Nine Symptom Checklist (PHQ-9)*
   - Sum score of all 9 items

4b. *The Low Sodium Eating Behavior Scale*
   - Mean total score (29 items) and mean score of each of three factors.

5a. *Survey of Illness Beliefs in HF*
   - Mean score of all 14 items

5b. Physician type, recent HF hospitalization, recent participation in a HF research study, cardiac transplant evaluation or enlistment, and *Activity Scale*
   - Sum score of all 5 objective cues

5c. *Nine Symptom Checklist (PHQ-9)*
   - Sum score of all 9 items

5d. *The Low Sodium Eating Behavior Scale*
   - Mean total score (29 items) and mean score of each of three factors.

- Pearson correlation of 4a to 4b using a one-tailed test of significance.
- Determined the correlation coefficient ($r = \text{strength and direction of association}$) between the standardized sum score of depression and mean total and factor scores of perceived low sodium diet self-efficacy.
- Regression coefficient (B) to determine the rate of change in the DV (5d) per unit change in the IV’s (5a, 5b, 5c).
- $R^2$ determined the association of all the IV’s on the DV.
- Determined the independent impact of each IV (5a, 5b, 5c) on each other (simultaneously) to learn the correlation between the IV’s on the DV and the independent impact of each IV being studied.
### Table 2 (continued).

<table>
<thead>
<tr>
<th>Research Hypotheses</th>
<th>Instruments Used to Test Hypothesis;</th>
<th>Analysis Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV(s) → DV</td>
<td>Refer to Appendix A for scoring</td>
<td></td>
</tr>
</tbody>
</table>
| 6. Accuracy of HF illness beliefs + number of objective cues of HF + depression level → perceived diet self-efficacy holds when controlling for age, race, gender, socio-economic status, marital status, education level, and medical history. | 6a. *Survey of Illness Beliefs in HF*  
  • Mean score of all 14 items | Regression coefficient (B) to determine the rate of change in the DV (6d) per unit change in the IV (6a, 6b, 6c) when controlling for age, race, gender, socio-economic status, marital status, education level, and history of four medical conditions. |
|                     | 6b. Physician type, recent HF hospitalization, recent participation in a HF research study, cardiac transplant evaluation or enlistment, and *Activity Scale*  
  • Sum score of all 5 objective cues |                      |
|                     | 6c. *Nine Symptom Checklist (PHQ-9)*  
  • Sum score of all 9 items |                      |
|                     | 6d. *The Low Sodium Eating Behaviors Scale*  
  • Mean total score (29 items) and mean score of each of three factors. |                      |
| 6e. Age (continuous variable); race (ordinal variable); gender (ordinal variable); socioeconomic status: (a) someone to confide in (nominal variable) and (b) comfort living on family income (ordinal variable); marital status (ordinal variable); education level (ordinal variable); and history of medical conditions (nominal variable for each: medically managed diabetes mellitus, asthma, chronic obstructive pulmonary disease, and atrial fibrillation). | Note. DV = dependent variable; HF = systolic heart failure; IV = independent variable. |
Human Subjects

Physician support for this research was provided (Appendix N). This project was submitted for approval to the Institutional Review Boards of The Cleveland Clinic Foundation and Kent State University (Appendix O contains approval letters from each institution). There were no interventions in this study. Participants completed one questionnaire of six surveys that used a Likert format, yes/no, multiple choice and short fill-in-the-blank responses. Participants permitted an investigator to review the medical record for medical history once informed consent was obtained. There were no further participant responsibilities. There was no cost and no payments made to participants who enrolled in this study. Only one participant requested information on payment for participating.

Study inconvenience and risks to the patient were minimal. Inconvenience was minimized by using clear instructions on each survey, in the invitation, and on the cover letter that accompanied the mailed questionnaire. The principal investigator queried patients to optimize telephone participation when that route of data collection was chosen. Individuals completed the questionnaire in a comfortable home environment, reducing distressing noise, smells, or other sensory stimuli. Contact with the principal investigator was facilitated in mailed questionnaires by providing a brief, large print note at the bottom of the sixth survey and a note in the cover letter with the local and 1-800 telephone numbers of the principal investigator. For telephone surveys, before closing the telephone conversation, patients were asked if they wished to discuss anything further. In addition, most telephone respondents received the survey packet with the principal investigator’s contact information as described above. The Survey of Illness Beliefs in HF
and the *Nine Symptom Checklist* could promote reflection on the HF condition, emotional themes, or cause someone to become emotionally distraught; however, in this sample, only two participants verbalized emotional distress during telephone questionnaire completion. In both cases, the distress was centered on their advanced HF condition and not on survey content or questionnaire completion (for example, one participant verbalized distress over not being able to help his wife by cutting the lawn or shoveling snow as he once had). No participants who completed the questionnaire by mail requested contact with the principal investigator to verbalize thoughts and feelings about HF.

Twenty participants had depression scores in the moderate-severe or severe range (score of 15 or greater by *Nine Symptom Checklist*). Of these, seven participants did not have a history of depression via the medical record or were not on an antidepressant medication. The principal investigator notified these seven participants of their score via telephone (n = 5) and via letter (n = 2), encouraged them to seek medical care through their primary care physician, and informed them that their primary physician was notified of the depression score. The Cleveland Clinic primary care physician was notified by letter of the moderate-severe to severe depression finding in the survey results (via the secure internal hospital electronic mail system) and was informed that the patient received a message regarding their depression score and recommendations for follow-up care. In each of the seven cases, the principal investigator recorded a note in the participant’s paper medical record.

Patients received no direct benefit from being in this study. However, patients might have benefited indirectly by wanting to learn more about their HF condition to
increase the accuracy of illness beliefs that make up their HF representation. The statements posed in the *Survey of Illness Beliefs in HF* might promote a desire to learn more about specific HF illness attributes and may prompt patients to ask their health care providers questions related to statement themes. Likewise, patients may have requested information about a low-sodium diet once they were exposed to diet self-efficacy questions. No participants requested additional information about HF from the principal investigator or designees.

The information obtained in this study provides valuable information on patient HF representations and depression that may be important predictors of diet self-care behaviors and adherence to diet behaviors. The knowledge gained through this research study may facilitate the next step in this program of research to be carried out, an education intervention study.
Chapter IV. Results

This chapter presents the results of sample characteristics, relationships of variables to one another, and analyses examining the six hypotheses tested.

Participant Characteristics on Perceived Diet Self-Efficacy and Predictor Variables

Table 3 presents the number and percent of respondents who expressed confidence in carrying out low sodium diet behaviors stratified by age, gender, and race. In what follows, the outcome variable, perceived low sodium diet self-efficacy, will be referred to as “Diet SE.” In addition to total Diet SE, data is stratified by the three factors that make up total Diet SE: resisting relapse, reducing salt, and behavioral skills. Diet SE was measured on a five point Likert scale ranging from no confidence (sure I could not do it) to complete confidence (sure I can do it) in perceived ability to carry out low sodium diet behaviors. Reported here is the number and percent of respondents who scored at either may be able to do it or sure I can do it; both reflect confidence in Diet SE.

The outcome variable, Diet SE, is comprised of three factors: resisting relapse, reducing salt, and behavioral skills. In the right-most column of Table 3 is presented the number and percent of the combined score of the three factors (total Diet SE) by age, gender, and race.

Looking first at the distribution of age, respondents differed by age ($p < 0.05$). A higher proportion of respondents fell into the 60-69 and 70-79 age range ($n = 124$ of 219...
or 57% of the total sample). Few respondents were under 50 years of age (23 or 10%) or over 80 years of age (29 or 13%). Overall, a high proportion of respondents expressed confidence in carrying out Diet SE; over 60% of respondents in the 40 and under and 50 and over age groups reported confidence. This is in contrast to only 50% of respondents reporting confidence in participants aged 40-49 years.

Table 3

Confident in Carrying Out Low Sodium Diet Self Efficacy by Age, Gender, and Race

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40 (n = 5)</td>
<td>4 (80%)*</td>
<td>3 (60%)</td>
<td>4 (80%)</td>
<td>4 (80%)</td>
</tr>
<tr>
<td>40-49 (n = 18)</td>
<td>7 (39%)*</td>
<td>10 (56%)</td>
<td>10 (56%)</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>50-59 (n = 43)</td>
<td>27 (63%)*</td>
<td>32 (74%)</td>
<td>26 (61%)</td>
<td>30 (70%)</td>
</tr>
<tr>
<td>60-69 (n = 61)</td>
<td>45 (74%)*</td>
<td>47 (77%)</td>
<td>36 (59%)</td>
<td>43 (71%)</td>
</tr>
<tr>
<td>70-79 (n = 63)</td>
<td>42 (67%)*</td>
<td>49 (78%)</td>
<td>39 (62%)</td>
<td>43 (68%)</td>
</tr>
<tr>
<td>80-89 (n = 29)</td>
<td>23 (79%)*</td>
<td>24 (83%)</td>
<td>23 (79%)</td>
<td>25 (86%)</td>
</tr>
</tbody>
</table>

Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (n = 155)</td>
<td>109 (70%)</td>
<td>116 (75%)</td>
<td>95 (61%)</td>
<td>111 (72%)</td>
</tr>
<tr>
<td>Female (n = 64)</td>
<td>39 (61%)</td>
<td>49 (77%)</td>
<td>43 (67%)</td>
<td>43 (67%)</td>
</tr>
</tbody>
</table>

Race

<table>
<thead>
<tr>
<th>Race</th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian (n = 188)</td>
<td>126 (67%)</td>
<td>141 (75%)</td>
<td>113 (60%)</td>
<td>131 (70%)</td>
</tr>
<tr>
<td>AA (n = 31)</td>
<td>22 (71%)</td>
<td>24 (77%)</td>
<td>25 (81%)</td>
<td>23 (74%)</td>
</tr>
</tbody>
</table>


* = p <0.05

Overall, this study sample is representative of cardiac patients at Cleveland Clinic Foundation. Cardiac patients at Cleveland Clinic are approximately six years younger than the national average (ADHERE, 2004) since the hospital supports cardiac transplantation program services that most community hospital or healthcare systems do
not offer. Other demographics are consistent with national data for subjects with systolic HF. At Cleveland Clinic, the mean age of patients treated for heart failure is 66.6 years, based on the cohort obtained for this sample, prior to exclusions. Of the 1956 CCF patients included in the randomization, the mean age is 65.8 years. The mean and median age of the 219 participants in this sample is 65.8 (SD ± 12.43) and 66 years, respectively.

Using the Pearson Chi-Square statistic, the relationship between age and Diet SE was assessed. Perceived total Diet SE and ability to resist relapse in eating foods high in sodium is significantly related to age ($p < 0.05$). The youngest (under 40 years) and oldest (over 79 years) participant groups have higher confidence in total Diet SE and resisting relapse for Diet SE than participants aged 40-79 years. Confidence in ability to reduce dietary salt increases with aging; approximately 60% of younger participants versus over 80% of the oldest participants were confident in reducing salt for Diet SE.

Over twice as many males (155 or 71%) as females (64 or 29%) participated in this study. The majority of respondents are Caucasian; 188 (86%) compared to 31 (14%) African American. Prior to randomization, the cohort of 1956 patients is similar in gender to the 219 respondents (69% male), but there are fewer Caucasians (76%) and more African Americans (22%) and Asians/Hispanics (1%). In ADHERE, a United States database of over 100,000 patients admitted to the hospital for decompensated HF, 73% of cases are Caucasian, 19% are African American and 3% are Hispanic (ADHERE, 2004). Using Pearson Chi-Square statistic, there is no association in the percent of respondents reporting confidence for each factor of Diet SE and total Diet SE, based on gender and race.
Diet SE is reported in Table 4 by education, marital status, and socioeconomic status. Over half the respondents have post high school education (n = 122 of 219 or 56%), nearly three fourths are married (156 or 72%), most have someone to confide in (197 or 90%) and about three fourths (161 or 74%) live comfortably on their income. Using the Pearson Chi-Square statistic, the relationship between marital status and perceived ability to resist relapse in eating high sodium foods is significant ($p < 0.05$). A greater number of married participants report ability to resist relapse ($p < 0.05$). Participants with someone to confide in have higher Diet SE behavioral skills ($p < 0.05$) and total Diet SE ($p < 0.01$). There are no differences in the percent of respondents reporting confidence for each factor of Diet SE and total Diet SE based on comfort living on family income.
Table 4

Confident in Carrying Out Low Sodium Diet Self Efficacy by Education and SE Status

<table>
<thead>
<tr>
<th></th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; HS G (n = 39)</td>
<td>25 (64%)</td>
<td>28 (72%)</td>
<td>24 (61%)</td>
<td>26 (67%)</td>
</tr>
<tr>
<td>HS G (n = 58)</td>
<td>38 (65%)</td>
<td>45 (78%)</td>
<td>36 (62%)</td>
<td>42 (72%)</td>
</tr>
<tr>
<td>&gt; HS Edu. (n = 122)</td>
<td>85 (70%)</td>
<td>92 (75%)</td>
<td>78 (64%)</td>
<td>86 (70%)</td>
</tr>
</tbody>
</table>

| **Marital Status**   |                   |               |                   |         |
| Married (n = 156)    | 109 (70%)*        | 121 (78%)     | 96 (61%)          | 114 (73%)|
| Not Mar. (n = 64)    | 39 (63%)*         | 44 (71%)      | 42 (68%)          | 40 (64%)|

| **Someone- Confide In** |                   |               |                   |         |
| Yes (n = 197)          | 138 (70%)         | 153 (78%)     | 130 (66%)*        | 145 (74%)***|
| No (n = 21)            | 10 (48%)          | 12 (57%)      | 8 (38%)*          | 9 (43%)***|

| **Comfort on Income** |                   |               |                   |         |
| Yes (n = 161)         | 109 (68%)         | 123 (76%)     | 100 (62%)         | 113 (70%)|
| No (n = 58)           | 39 (67%)          | 42 (72%)      | 38 (66%)          | 41 (71%)|

Note. HS = high school; Edu. = education; G = graduate; Mar. = married. Note. N = 219.

* = p < 0.05; ** = p < 0.01

In Table 5 is presented the percent of respondents with accurate and inaccurate HF illness beliefs based on age, gender, and race. Accuracy of illness beliefs are measured using a 14-item survey of accurately and inaccurately worded statements. Participants response on a 4-point Likert scale that ranges from strongly disagree to strongly agree with each statement. A mean score below 3 reflects inaccurate illness beliefs. Individual item mean scores closer to 2 or 4 reflect the level of uncertainty or certainty, respectively that participants have in their illness beliefs. Participants have
inaccurate illness beliefs, as reflected in a mean illness beliefs score of 2.99 (SD ± .31) and a median score of 2.92.

Table 5

**Heart Failure Illness Beliefs by Age, Gender, and Race**

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Inaccurate Beliefs</th>
<th>Accurate Beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40 (n = 5)</td>
<td>4 (80%)**</td>
<td>1 (20%)**</td>
</tr>
<tr>
<td>40-49 (n = 18)</td>
<td>10 (56%)**</td>
<td>8 (44%)**</td>
</tr>
<tr>
<td>50-59 (n = 43)</td>
<td>8 (19%)**</td>
<td>35 (81%)**</td>
</tr>
<tr>
<td>60-69 (n = 61)</td>
<td>25 (41%)**</td>
<td>36 (59%)**</td>
</tr>
<tr>
<td>70-79 (n = 63)</td>
<td>45 (71%)**</td>
<td>18 (29%)**</td>
</tr>
<tr>
<td>80-89 (n = 29)</td>
<td>21 (72%)**</td>
<td>8 (28%)**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Inaccurate Beliefs</th>
<th>Accurate Beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (n = 155)</td>
<td>77 (50%)</td>
<td>78 (50%)</td>
</tr>
<tr>
<td>Female (n = 64)</td>
<td>36 (56%)</td>
<td>28 (44%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>Inaccurate Beliefs</th>
<th>Accurate Beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian (n = 188)</td>
<td>88 (47%)**</td>
<td>100 (53%)**</td>
</tr>
<tr>
<td>AA (n = 31)</td>
<td>25 (81%)</td>
<td>6 (19%)</td>
</tr>
</tbody>
</table>


** = p < 0.01

The two items with the lowest scores, reflecting greatest inaccuracy of HF illness beliefs are “may improve with drugs and a lot of time” (mean = 2.18, SD ± .66) and “requires me to drink fluids, especially when I am thirsty” (mean = 2.65, SD ± .76). The two items with the highest scores reflecting greatest accuracy of HF illness beliefs are “is a threat to my health” (mean = 3.34, SD ± .60) and “can be disabling” (mean = 3.33, SD ± .59).
Greater than 70% (n = 4 of 5) of the youngest participants (under age 40) and those aged 70 or older (n = 66 of 92 participants) have inaccurate HF illness beliefs. Using Pearson Chi-Square statistic, there is a relationship ($p < 0.01$) between age and accuracy of HF illness beliefs. Over 80% of African Americans (n = 25 of 31) have inaccurate illness beliefs while 47% (n = 88 of 188) of Caucasians have inaccurate beliefs ($p < 0.01$). Thus, African Americans are much more apt to have inaccurate illness beliefs.

Accuracy of HF illness beliefs by education, marital status, and socioeconomic status are presented in Table 6. The only apparent relationship between HF illness beliefs and the demographic variables is education. Using the Pearson Chi-Square statistic, the accuracy of participants’ HF illness beliefs increase significantly as level of education rises ($p < 0.01$). Only 15% (n = 6 of 39) of those who have not completed high school have accurate illness beliefs compared to over one-half (n = 75 of 122) of those who have post high school education.
Table 6

*Heart Failure Illness Beliefs by Education, Marital Status, and Socioeconomic Status*

<table>
<thead>
<tr>
<th></th>
<th>Inaccurate Beliefs</th>
<th>Accurate Beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; HS Grad (n = 39)</td>
<td>33 (85%)*</td>
<td>6 (15%)*</td>
</tr>
<tr>
<td>HS Grad (n = 58)</td>
<td>33 (57%)*</td>
<td>25 (43%)*</td>
</tr>
<tr>
<td>&gt; HS Edu. (n = 122)</td>
<td>47 (38%)*</td>
<td>75 (62%)*</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (n = 156)</td>
<td>75 (48%)</td>
<td>81 (52%)</td>
</tr>
<tr>
<td>Not Mar. (n = 64)</td>
<td>38 (60%)</td>
<td>25 (40%)</td>
</tr>
<tr>
<td><strong>Someone Confide In</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 197)</td>
<td>98 (50%)</td>
<td>99 (50%)</td>
</tr>
<tr>
<td>No (n = 21)</td>
<td>14 (67%)</td>
<td>7 (33%)</td>
</tr>
<tr>
<td><strong>Comfort on Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 161)</td>
<td>84 (52%)</td>
<td>77 (48%)</td>
</tr>
<tr>
<td>No (n = 58)</td>
<td>29 (50%)</td>
<td>29 (50%)</td>
</tr>
</tbody>
</table>

Note. Edu. = Education; Grad = Graduate; HS = High School; Mar. = married. N = 219.

** = p < 0.01

In Table 7 and 8 is presented the percent of participants with different levels of objective cues of HF severity by the control variables: age, gender, race (Table 7), education, marital status, someone to confide in, and level of comfort living on family income (Table 8). Objective cues of HF are measured by summing the scores of five cues: recent hospitalization (yes = 1), recent participation in a HF research study (yes = 2), cardiac transplantation evaluation or enlistment (yes = 3), functional status measured by the *Activity Scale* (range = 1-4), and physician type (internal medicine or other non-
cardiologist physician, cardiologist or HF specialty cardiologist; range = 1-3). Higher sum score reflects more objective cues participants have about the severity of their HF.

Table 7

**Objective Cues of Heart Failure by Age, Gender, and Race**

<table>
<thead>
<tr>
<th>None to Few/Mild</th>
<th>Some/Moderate</th>
<th>Many/Moderate-Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 40 (n = 5)</td>
<td>3 (60%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>40-49 (n = 18)</td>
<td>10 (56%)</td>
<td>6 (33%)</td>
</tr>
<tr>
<td>50-59 (n = 43)</td>
<td>20 (47%)</td>
<td>16 (37%)</td>
</tr>
<tr>
<td>60-69 (n = 61)</td>
<td>35 (57%)</td>
<td>24 (39%)</td>
</tr>
<tr>
<td>70-79 (n = 63)</td>
<td>38 (60%)</td>
<td>24 (38%)</td>
</tr>
<tr>
<td>80-89 (n = 29)</td>
<td>19 (66%)</td>
<td>10 (34%)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n =155)</td>
<td>89 (57%)</td>
<td>57 (37%)</td>
</tr>
<tr>
<td>Female (n = 64)</td>
<td>36 (56%)</td>
<td>25 (39%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cauc. (n = 188)</td>
<td>106 (56%)</td>
<td>71 (38%)</td>
</tr>
<tr>
<td>AA (n = 31)</td>
<td>19 (61%)</td>
<td>11 (36%)</td>
</tr>
</tbody>
</table>

Table 8

*Objective Cues of Heart Failure by Education, Marital Status, and Socioeconomic Status*

<table>
<thead>
<tr>
<th></th>
<th>None to Few/Mild</th>
<th>Some/Moderate</th>
<th>Many/Moderate-Severe</th>
</tr>
</thead>
</table>

**Education**

<table>
<thead>
<tr>
<th></th>
<th>None to Few/Mild</th>
<th>Some/Moderate</th>
<th>Many/Moderate-Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; HS Grad (n = 39)</td>
<td>21 (54%)</td>
<td>16 (41%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td>HS Grad (n = 58)</td>
<td>28 (48%)</td>
<td>25 (43%)</td>
<td>5 (9%)</td>
</tr>
<tr>
<td>&gt; HS Educ. (n = 122)</td>
<td>76 (62%)</td>
<td>41 (34%)</td>
<td>5 (4%)</td>
</tr>
</tbody>
</table>

**Marital Status**

<table>
<thead>
<tr>
<th></th>
<th>None to Few/Mild</th>
<th>Some/Moderate</th>
<th>Many/Moderate-Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married (n = 156)</td>
<td>85 (54%)</td>
<td>62 (40%)</td>
<td>9 (6%)</td>
</tr>
<tr>
<td>Not Married (n = 64)</td>
<td>40 (64%)</td>
<td>20 (31%)</td>
<td>3 (5%)</td>
</tr>
</tbody>
</table>

**Someone - Confide In**

<table>
<thead>
<tr>
<th></th>
<th>None to Few/Mild</th>
<th>Some/Moderate</th>
<th>Many/Moderate-Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (n = 197)</td>
<td>113 (57%)</td>
<td>72 (37%)</td>
<td>12 (6%)</td>
</tr>
<tr>
<td>No (n = 21)</td>
<td>12 (57%)</td>
<td>9 (43%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

**Comfort Living on Income**

<table>
<thead>
<tr>
<th></th>
<th>None to Few/Mild</th>
<th>Some/Moderate</th>
<th>Many/Moderate-Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (n = 161)</td>
<td>98 (61%)</td>
<td>56 (35%)</td>
<td>7 (4%)</td>
</tr>
<tr>
<td>No (n = 58)</td>
<td>27 (47%)</td>
<td>26 (45%)</td>
<td>5 (9%)</td>
</tr>
</tbody>
</table>

Note. Educ. = education; Grad = graduate; HS = high school. N = 219.

Approximately one half to two-thirds of participants have none to few or mild objective cues of HF and 10% or less of participants have many or moderate to severe objective cues that their HF is a serious condition. Thus, level of objective cues for these participants is low. When using Pearson Chi-Square statistic to determine differences in the frequency of objective cues by control variables, findings demonstrate no difference in objective cues by all control variables. Nationally, there is no direct comparison for the objective cue score; however, in the V-HeFT I and V-HeFT II, 60-70% of participants reported asymptomatic to mild HF, 15-20% reported moderate HF and 11-15% reported
severe HF by NYHA functional status (Cohn, 1994). Using the Pearson Chi-Square statistic, there is no association between different levels of demographic, education, and socioeconomic variables and objective cues of HF severity.

The presence and level of depression by age, gender, and race is presented in Table 9. Depression is measured by obtaining a sum score of a 9-item tool, the *Nine Symptom Checklist* (also known as the Patient Health Questionnaire (PHQ)-9). Scores range from 0 to 27 and scores of 5 or higher reflect the presence of depression. As scores increase incrementally from 5 to 10 to 15 and to 20 or higher, the level of depression increases. In this study, over half (53% or 116 of 219) of participants are not depressed. Of those participants with depression, 26% (n = 56) have mild, 12% (n = 27) have moderate, 6% (n = 13) have moderate-severe and 3% (n = 7) have severe depression. There is no data of the rate or intensity of depression in CCF patients with HF; however, in a multicenter study of depression in 460 ambulatory patients with HF, 30% had substantial depressive symptoms at baseline (Rumsfeld et al., 2003). Thus, the participants in the present study have less depression than in other studies of patients with HF.

Level of depression is associated with age. Using the Pearson Chi-Square statistic, moderate to severe depression is more prevalent in participants aged 40-59 years compared to participants who are young (under 40 years) or over 60 years ($p < 0.05$). Participants aged 40-59 years have a 40% rate of moderate to severe depression compared to the other age groups that have a rate of depression of 20% or less. There are no gender or race differences in level of depression.
Table 9

*Level of Depression by Age, Gender, and Race*

<table>
<thead>
<tr>
<th>Age, years</th>
<th>None-Mild</th>
<th>Moderate-Moderate-</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40, (n = 5)</td>
<td>4 (80%)*</td>
<td>1 (20%)*</td>
<td>0 ( 0%)*</td>
</tr>
<tr>
<td>40-49, (n = 18)</td>
<td>11 (61%)*</td>
<td>6 (33%)*</td>
<td>1 ( 6%)*</td>
</tr>
<tr>
<td>50-59, (n = 43)</td>
<td>26 (60%)*</td>
<td>14 (33%)*</td>
<td>3 ( 7%)*</td>
</tr>
<tr>
<td>60-69, (n = 61)</td>
<td>54 (88%)*</td>
<td>6 (10%)*</td>
<td>1 ( 2%)*</td>
</tr>
<tr>
<td>70-79, (n = 63)</td>
<td>50 (79%)*</td>
<td>11 (18%)*</td>
<td>2 ( 3%)*</td>
</tr>
<tr>
<td>80-89, (n = 29)</td>
<td>27 (93%)*</td>
<td>2 ( 7%)*</td>
<td>0 ( 0%)*</td>
</tr>
</tbody>
</table>

Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>None-Mild</th>
<th>Moderate-Moderate-</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male, (n = 155)</td>
<td>123 (79%)</td>
<td>27 (17%)</td>
<td>5 ( 3%)</td>
</tr>
<tr>
<td>Female, (n = 64)</td>
<td>49 (77%)</td>
<td>13 (20%)</td>
<td>2 ( 3%)</td>
</tr>
</tbody>
</table>

Race

<table>
<thead>
<tr>
<th>Race</th>
<th>None-Mild</th>
<th>Moderate-Moderate-</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian (n = 188)</td>
<td>147 (78%)</td>
<td>35 (19%)</td>
<td>6 ( 3%)</td>
</tr>
<tr>
<td>AA (n = 31)</td>
<td>25 (81%)</td>
<td>5 (16%)</td>
<td>1 ( 3%)</td>
</tr>
</tbody>
</table>


* = \( p < 0.05 \)

In Table 10 is presented the percent of participants with different levels of depression by education, marital status, having someone to confide in, and level of comfort living on family income. Education level and marital status are not associated with level of depression.

Those who have someone to confide in are less likely to be depressed \( (p < 0.01) \) using the Pearson Chi-Square statistic. Level of comfort of living on family income is associated with level of depression \( (p < 0.01) \). Forty three percent \( (n = 25\) of 58\) of participants who believe their income is not enough to live comfortably have moderate (34%) or severe (9%) depression compared to 14% \( (n = 22\) of 161; 12% moderate and 2% severe depression) of those whose family income is adequate to live on. Thus, level
of comfort is associated with level of depression; that is, those who are not comfortable living on their family income are more depressed.

Table 10

*Level of Depression by Education, Marital Status, and Socioeconomic Status*

<table>
<thead>
<tr>
<th></th>
<th>None-Mild</th>
<th>Moderate-Moderate-Severe</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; HS Graduate (n = 39)</td>
<td>27 (69%)</td>
<td>11 (28%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>HS Graduate (n = 58)</td>
<td>43 (74%)</td>
<td>14 (24%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>&gt; HS Education (n = 122)</td>
<td>102 (84%)</td>
<td>15 (12%)</td>
<td>5 (4%)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (n = 156)</td>
<td>122 (78%)</td>
<td>28 (18%)</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Not Married (n = 63)</td>
<td>50 (80%)</td>
<td>12 (19%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Someone to Confide In</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 197)</td>
<td>160 (81%)**</td>
<td>33 (17%)**</td>
<td>4 (2%)**</td>
</tr>
<tr>
<td>No (n = 21)</td>
<td>12 (57%)**</td>
<td>6 (29%)**</td>
<td>3 (14%)**</td>
</tr>
<tr>
<td><strong>Comfort on Income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 161)</td>
<td>139 (86%)**</td>
<td>20 (12%)**</td>
<td>2 (2%)**</td>
</tr>
<tr>
<td>No (n = 58)</td>
<td>33 (57%)**</td>
<td>20 (34%)**</td>
<td>5 (9%)**</td>
</tr>
</tbody>
</table>

Note. HS = high school. N = 219.

** = \( p < 0.01 \)

In Appendix P a table is created from a one-tailed Pearson Product Moment Correlation of control and independent study variables with total Diet SE and each of the three factors of Diet SE, resisting relapse, reducing salt, and behavioral skills. As is evident in Appendix P compared with previous contingency table analysis, the associations among variables related to the outcome variable, Diet SE, are similar;
however, some variables are associated with Diet SE using the Pearson Product Moment Correlation that are not found to be previously associated using Chi-Square analysis.

Of the control variables studied, younger and older participants are more confident in the ability to resist relapse and of their total Diet SE behaviors (both $p < 0.01$). However, advancing age predicts confidence in reducing salt ($p < 0.05$). Males have more confidence in being able to resist relapse in Diet SE ($p < 0.05$). Having someone to confide in is a predictor of resisting relapse ($p < 0.05$), reducing salt ($p < 0.01$), behavioral skills ($p < 0.01$), and total Diet SE ($p < 0.05$). Of medical condition histories, those who are medically managed for diabetes mellitus have less confidence in total Diet SE, and in their ability to resist relapse and reduce salt in Diet SE (all $p < 0.05$).

Of the predictor variables: accuracy of HF illness beliefs, objective cues of HF severity, and depression, depression is the only variable significantly related to total Diet SE ($p < 0.05$) and resisting relapse in Diet SE ($p < 0.01$). Those participants who are more depressed have less Diet SE and less ability to resist relapse in Diet SE. In addition, when individual objective cues are studied, participants with recent history of participating in a HF research study are less likely to follow low sodium behavioral skills of Diet SE ($p < 0.05$).

**Predictors of Diet SE: Analyses of Hypotheses**

In Table 11 is presented a summary of findings for Hypotheses 1, 2, 3, and 4.

**Hypothesis 1:** Patients with accurate HF illness beliefs have strengthened perceived diet self-efficacy.
Table 11

*Perceived Diet Self Efficacy as Predicted by HF Illness Beliefs, Objective Cues of HF, HF Illness Beliefs in Participants with Asymptomatic or Mild HF, and Depression*

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Perceived Diet Self Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resisting</td>
</tr>
<tr>
<td></td>
<td>Relapse</td>
</tr>
<tr>
<td>Hypothesis 1: Accuracy of illness beliefs (N = 219)</td>
<td>r = -.100</td>
</tr>
<tr>
<td>Hypothesis 2: Objective cues of HF (N = 219)</td>
<td>r = -.056</td>
</tr>
<tr>
<td>Hypothesis 3: Accuracy of illness beliefs in patients with asymptomatic or mild HF (n = 150)</td>
<td>R = -.057</td>
</tr>
<tr>
<td></td>
<td>β = -.057</td>
</tr>
<tr>
<td></td>
<td>F = .485</td>
</tr>
<tr>
<td>Hypothesis 4: Depression (N = 219)</td>
<td>r = -.206**</td>
</tr>
</tbody>
</table>

Note. HF = heart failure.

* = p < 0.05; ** = p < 0.01

To analyze Hypothesis one, a Pearson Product Moment Correlation was used to assess the association between accuracy of HF illness beliefs and perceived Diet SE (for total score and for each of the three factors). As shown in Table 11, none of the correlations is statistically significant. Thus, Hypothesis one is not supported.

Hypothesis 2: *Patients with a greater number of objective cues of HF severity have strengthened perceived diet self-efficacy.*
To analyze Hypothesis two, a Pearson Product Moment Correlation was used to assess the association between objective cues of HF severity and perceived Diet SE (for total score and for each of three factors). As shown in Table 11, none of the correlations is statistically significant. Thus, Hypothesis two is not supported.

Hypothesis 3: In patients with asymptomatic or mild HF (defined as functional status I or II), those with accurate HF illness beliefs will have greater strength in perceived diet self-efficacy than those with inaccurate HF illness beliefs.

To analyze Hypothesis three, a similar analysis was completed as for hypothesis 1 but with a subsample of participants with asymptomatic or mild HF (n = 150; 68% of sample) based on results from the Activity Scale. Participants with scores of 1-2 met criteria for asymptomatic or mild HF. Linear regression was performed for participants in the subsample using HF illness beliefs to predict perceived Diet SE (for total score and for each of three factors).

In the subsample of 150 participants with asymptomatic or mild HF, the mean illness belief score reflects accurate HF illness beliefs (3.01, SD ± .32); thus, the accuracy of illness beliefs is higher than for the total sample. Mean total Diet SE score in the subsample (4.18, SD ± .80) is similar to the mean score of the entire cohort. As shown in Table 11, there is no association between HF illness beliefs and Diet SE in this group of asymptomatic or mildly symptomatic participants (β = -.036; p = .66). Thus, Hypothesis three is not supported.

Hypothesis 4: Patients with higher level of depression have weakened perceived diet self-efficacy.
To analyze Hypothesis four, a Pearson Product Moment Correlation was used to assess the association between level of depression and perceived Diet SE (for total score and for each of three factors). As shown in Table 11, depressed participants have less confidence in their ability to resist relapse in Diet SE (r = .21, p < 0.01) and have less confidence in total Diet SE (r = .12, p < 0.05). Thus, Hypothesis four is supported.

Hypothesis 5: Accuracy of HF illness beliefs, objective cues of HF, and level of depression together explain a statistically significant amount of variance for perceived diet self-efficacy

To analyze Hypothesis five, multiple linear regression by simultaneous entry was performed using illness beliefs, objective cues of HF, and depression as independent variables predicting Diet SE (for total score and for each of the three factors). All variables were entered in a block as a single step to allow for the testing of the complete model as specified in Hypothesis 5 (Kleinbaum, Kupper, Miller & Nizam, 1998; Mertler & Vannatta, 2002). These data are presented in Figures 6, 7, 8, and 9. See Appendix Q for corresponding F values for predictor relationships in Figures 6, 7, 8, and 9.
Illness Beliefs

Objective Cues of HF

Depression

β = -.093, p = .17
β = .008, p = .91
β = -.118, p = .09

Figure 6. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy; Hypothesis 5.
Note. HF = heart failure.

R² for the total model = .023; p = 0.167

* = p < 0.05; ** = p < 0.01

Illness Beliefs

Objective Cues of HF

Depression

β = -.088, p = .19
β = .011, p = .87
β = -.204, p = .004

Figure 7. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Ability to Resist Relapse for Low Sodium Diet Self Efficacy.
Hypothesis 5.
Note. HF = heart failure

R² for the total model = .05; p = 0.011

* = p < 0.05; ** = p < 0.01
As is evident from these figures, the multiple linear regression model testing shows that the three independent variables in combination do not predict Diet SE at a statistically significant level for the outcome variable as a whole or for two of the three factors, reducing salt or behavioral skills. The $R^2$ for each is small. With exception in resisting relapse to Diet SE (which is statistically significant) as shown in Figure 7 and Appendix Q, the $R^2$s are non-significant.

![Diagram](image)

$R^2$ for the total model = .011; $p = 0.505$

* $p < 0.05$; ** $p < 0.01$

**Figure 8.** Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Ability to Reduce Salt for Low Sodium Diet Self Efficacy.

Hypothesis 5.

Note. HF = heart failure

Considering each variable independently, depression remains a significant predictor for resisting relapse for perceived Diet SE. That is, as depression increases, resisting relapse for Diet SE decreases (Figure 7; $p < 0.01$). The relationship of depression predicting resisting relapse for Diet SE was strong enough to support the combination model as a whole ($p < 0.01$). Thus, the hypothesis is supported for resisting
relapse for Diet SE but not supported for total Diet SE or reducing salt and behavioral
skills for Diet SE.

Of interest is the fact that two of the three independent variables are highly
correlated: HF illness beliefs is correlated with objective cues of HF (r = .120, p < 0.05)
and depression is correlated with objective cues of HF (r = .276, p < 0.01). Thus,
multicollinearity of independent variables in the model reduces the predictive power of
these variables used in combination, e.g. simultaneously.

![Diagram showing correlations between illness beliefs, objective cues of HF, depression, and perceived behavioral skills]

R² for the total model = .003; p = 0.894

* = p < 0.05; ** = p < 0.01

Figure 9. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Behavioral Skills for Low Sodium Diet Self Efficacy.

Hypothesis 5.

Hypothesis 6: The relationships in hypothesis number 5 hold when controlling for age, race, gender, socioeconomic status (someone to confide in and comfort living on family income), marital status, education level, and history of medical conditions: medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation.
Hypothesis five is not supported in that the combination of HF illness beliefs, objective cues of HF severity, and depression do not predict total Diet SE (Figure 6), reducing salt for Diet SE (Figure 8), or behavioral skills for Diet SE (Figure 9). However, the combination of HF illness beliefs, objective cues of HF severity, and depression did support resisting relapse for Diet SE (Figure 7). Further, depression is an individual significant predictor for predicting relapse for Diet SE (Figure 7). The focus of Hypothesis six is to determine (a) whether HF illness beliefs, objective cues of HF severity, and depression in combination holds as a significant predictor of resisting relapse for Diet SE outcomes and (b) whether depression individually holds as a significant predictor of resisting relapse for Diet SE when each of the controls are entered.

To analyze Hypothesis six, multiple linear regressions using the three independent variables (HF illness beliefs, objective cues of HF severity, and depression) in combination to predict total Diet SE and resisting relapse for Diet SE are performed. For these analyses, each prespecified variable is used as a control: age, race, gender, someone to confide in, comfort living on family income, marital status, education level, medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation.

Three control variables are significantly correlated with total Diet SE and factors of Diet SE by Pearson Product Moment Correlation (Appendix P; age, someone to confide in, and medically managed diabetes mellitus). These three control variables are entered into the model (age, someone to confide in, and medically managed diabetes mellitus; as depicted in Figures 10, 11, and 12, respectively). Looking at Figure 10, the model predicting total Diet SE holds at a statistically significantly level, that is, when age
is entered, the three predictor variables are statistically significant for explaining Total Diet SE \( (R^2 = .024, p < 0.05) \). Looking at Figure 11, when someone to confide in is entered as a control, the three predictor variables are statistically significant for explaining Total Diet SE \( (R^2 = .021, p < 0.05) \). Looking at Figure 12, when medically managed diabetes is entered as a control, the three predictor variables are statistically significant for explaining Total Diet SE \( (R^2 = .021, p < 0.05) \).

Figure 10. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy when Age is Controlled.

Hypothesis 6.

Note. HF = heart failure
Illness Beliefs

Objective Cues of HF

Depression

Total Perceived Diet Self Efficacy*

$\beta = .120^*$

$\beta = .035, p = .60$

$\beta = .089, p = .19$

$R^2$ for the total model = .021; $p = 0.033$

Control variable entered: Someone to confide in

$^* = p < 0.05; ~^*^* = p < 0.01$

Figure 11. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Perceived Diet Self Efficacy when Someone to Confide In is Controlled.

Hypothesis 6.

Note. HF = heart failure
**Figure 12.** Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Total Low Sodium Diet Self Efficacy when Medically Managed Diabetes Mellitus is Controlled.

Hypothesis 6.

Note. HF = heart failure

The same three control variables (age, someone to confide in, and medically managed diabetes mellitus) are entered into the statistically significant model depicted in Hypothesis five; that is, simultaneous multiple linear regression analyses was used to determine if the three independent variables in combination: HF illness beliefs, objective cues of HF, and depression continue to predict resisting relapse for Diet SE when control variables are entered. As seen in Figures 13 and 14, the model holds at a statistically significant level for two control variables. When age is entered as a control, the three predictor variables are statistically significant for explaining resisting relapse for Diet SE ($R^2 = .029, p < 0.01$; Figure 13). When medically managed diabetes is entered as a control, the three predictor variables are statistically significant for explaining resisting
relapse for Total Diet SE ($R^2 = .019, p < 0.05$; Figure 14). When the control variable someone to confide in is entered, the model does not hold for predicting resisting relapse for Diet SE.

$$
\begin{align*}
\text{Illness Beliefs} & \quad \beta = -0.055, p = 0.43 \\
\text{Objective Cues of HF} & \quad \beta = -0.020, p = 0.76 \\
\text{Depression} & \quad \beta = 0.177, p = 0.01
\end{align*}
$$

$R^2$ for the total model = 0.029; $p = 0.012$

Control variable entered: Age

* = $p < 0.05$; ** = $p < 0.01$

*Figure 13. Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Ability to Resist Relapse for Low Sodium Diet Self Efficacy when Age is Controlled.*

Hypothesis 6.

Note. HF = heart failure
Illness Beliefs

- β = -.097, p = .15

Objective Cues of HF

- β = -.075, p = .26

Depression

- β = -.242, p = .00

Perceived Ability to Resist Relapse for Diet Self Efficacy*

R² for the total model = .019; p = 0.04

Control variable entered: Medically managed diabetes mellitus

* = p < 0.05; ** = p < 0.01

**Figure 14.** Model Testing: Predicting HF Illness Beliefs, Objective Cues of HF, and Depression on Perceived Ability to Resist Relapse for Low Sodium Diet Self Efficacy when Medically Managed Diabetes Mellitus is Controlled. Hypothesis 6.

Note. HF = heart failure

In summary, Figures 10 through 14 depict models that demonstrate a statistically significant association between the three independent variables in combination on the outcome variables, total Diet SE and resisting relapse for Diet SE, when control variables are simultaneously entered. As noted in these figures and as seen in the other multiple regression analyses conducted (not depicted in figures), the three independent variables individually are not associated with total Diet SE or the three factors of Diet SE in most of the linear regression models created when controlling for many of the prespecified control variables. However, depression remains associated with resisting relapse for Diet SE while controlling for age, race, gender, someone to confide in, education level, medically managed diabetes, asthma, COPD, and atrial fibrillation. Because depression (as an individual independent variable) remains a statistically significant predictor when
using all variables as a control except for marital status and comfort living on family income, the results of using depression as a predictor in the models is presented in Table 12. As depression increases, ability to resist relapse for Diet SE is reduced (all \( p < 0.01 \)); however, as noted in Table 12, depression does not significantly predict reducing salt or behavioral skills for Diet SE when control variables are entered. When using medically managed diabetes mellitus as a control variable, depression continues to predict Total Diet SE at a statistically significant level \((p < 0.05)\). See Appendix R for corresponding t values for each beta in Table 12. As stated above, marital status and comfort living on family income were excluded from regression analysis since they were not significantly associated with depression, as seen in Appendix P.

The \( R^2 \) in each model, even when the model is significant for predicting the outcome variable, is small. As noted in Figure 10 when controlling for age, while the model (a combination of the three predictor variables) is statistically significant in predicting total Diet SE, none of the predictor variables individually predicts total Diet SE.

Thus, Hypothesis six is partially supported in that the three predictor variables (HF illness beliefs, objective cues of HF, and depression) in combination do not hold as predictors of total Diet SE and resisting relapse for Diet SE after many control variables are entered. After controlling for age, someone to confide in, and medically managed diabetes, the model is significant for Total Diet SE. After adjusting for age and medically managed diabetes, the model is significant for resisting relapse for Diet SE.
Table 12

*Depression as a Predictor for Perceived Diet Self Efficacy, Using Control Variables*

<table>
<thead>
<tr>
<th>Controls:</th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>$\beta = -.18^{**}$</td>
<td>$\beta = -.02$</td>
<td>$\beta = .05$</td>
<td>$\beta = -.12$</td>
</tr>
<tr>
<td>Race</td>
<td>$\beta = -.21^{**}$</td>
<td>$\beta = -.04$</td>
<td>$\beta = .03$</td>
<td>$\beta = -.13$</td>
</tr>
<tr>
<td>Gender</td>
<td>$\beta = -.20^{**}$</td>
<td>$\beta = -.04$</td>
<td>$\beta = .03$</td>
<td>$\beta = -.12$</td>
</tr>
<tr>
<td>Someone to confide in</td>
<td>$\beta = -.18^{**}$</td>
<td>$\beta = -.00$</td>
<td>$\beta = .08$</td>
<td>$\beta = -.09$</td>
</tr>
<tr>
<td>Highest education level</td>
<td>$\beta = -.21^{**}$</td>
<td>$\beta = -.04$</td>
<td>$\beta = .03$</td>
<td>$\beta = -.13$</td>
</tr>
<tr>
<td>Medical history of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes, medically managed</td>
<td>$\beta = -.24^{**}$</td>
<td>$\beta = -.07$</td>
<td>$\beta = .01$</td>
<td>$\beta = -.16^{*}$</td>
</tr>
<tr>
<td>Asthma</td>
<td>$\beta = -.21^{**}$</td>
<td>$\beta = -.04$</td>
<td>$\beta = .03$</td>
<td>$\beta = -.12$</td>
</tr>
<tr>
<td>COPD</td>
<td>$\beta = -.21^{**}$</td>
<td>$\beta = -.05$</td>
<td>$\beta = .03$</td>
<td>$\beta = -.13$</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>$\beta = -.20^{**}$</td>
<td>$\beta = -.04$</td>
<td>$\beta = .03$</td>
<td>$\beta = -.12$</td>
</tr>
</tbody>
</table>


* $p < 0.05$; ** $p < 0.01$

When studying depression individually as a predictor of the outcome variables in these models, it is the only predictor variable significantly associated with two outcome variables, total Diet SE and resisting relapse for Diet SE. While depression does not predict total Diet SE when most control variables are entered in the model; it is a significant predictor of Diet SE when medically managed diabetes mellitus is entered. Additionally, depression as an individual predictor variable is significantly associated with resisting relapse for Diet SE when most control variables are entered. The individual
association of depression to resisting relapse for Diet SE is strong enough to provide overall significance in the model. Thus, after adjusting for most control variables, as depression increases, confidence in resisting relapse in Diet SE decreases.
Chapter V. Discussion

The Common Sense Model of Illness Representation formulated by Diefenbach and Leventhal (1996) provided the framework for the present study. In this model, cognitive conceptual (knowledge) and perceptual stimuli (symptoms, sensations, and situations) are organized, analyzed, and interpreted to form implicit theories of illness and treatment (also known as an illness representation). The processing of cognitive conceptual and perceptual stimuli creates an illness threat that leads to coping and also prompts an emotional response that leads to coping. In this model, Diefenbach and Leventhal theorize that coping promotes self-care behaviors. In the present study, the self care behavior of interest is low sodium diet self-efficacy. Diet behaviors are variable from day to day; however, Bandura (1977) found that self-efficacy for a behavior promotes behavior adherence in a stable manner over time. Therefore, the strength of a person’s confidence in their capability to carry out low sodium diet behavior (Diet SE) was used as the outcome variable.

In the present study, cognitive conceptual and perceptual responses to illness threat were studied in combination. Conceptual responses to illness threat were studied by assessing the accuracy of patients’ illness beliefs about heart failure (HF). It was theorized that greater accuracy of illness beliefs would heighten the level of threat of HF and promote coping by strengthened Diet SE. Perceptual responses to illness threat were studied by assessing the number of objective cues of HF severity patients currently
experienced. The objective cues included symptoms and sensations that limit activity (as discussed in the Common Sense Model of Illness Representation) and other identifiable cues of HF severity (physician type, recent hospitalization, participation in a research study, and evaluation or enlistment for cardiac transplantation). It was theorized that greater number of objective cues of HF severity would heighten the level of threat of HF and promote coping by strengthening Diet SE.

In the Common Sense Model, the emotional response to illness threat imposed by HF representation impacts coping. Positive or negative emotional responses prompt coping behaviors. In the present study, it was theorized that depression (as an emotional response to HF representation and cognitive illness threat) would prompt coping that decreased Diet SE.

Diet SE in this study was assessed via a survey that measured total Diet SE and factors of Diet SE: resisting relapse, reducing salt, and behavioral skills. Accuracy of HF illness beliefs, number of objective cues of HF severity, and level of depression were studied as predictors of Diet SE. In analyses, each predictor was studied independently to learn if it predicted Diet SE. Accuracy of HF illness beliefs was studied further to learn if it predicted Diet SE in patients who were asymptomatic or had mild symptoms of HF. The three predictors were combined and studied simultaneously to assess if together they predicted Diet SE. Finally, using the combination model of the three predictor variables together, prespecified control variables were studied to learn if significant relationships held when controlling for age, race, gender, someone to confide in, comfort living on family income, marital status, education level, and medical history of medically managed diabetes mellitus, asthma, COPD, and atrial fibrillation. A summary of findings and an
explanation of study results follows. Limitations are noted as well as contributions to the
literature. Implications for nursing research and practice are discussed.

Summary of Findings

Participants in this study were generally male, elderly, Caucasian, married,
educated at high school level or greater, had someone to confide in, and were comfortable
living on their current family income. Almost one-half had a history of atrial fibrillation
and over one-quarter had pulmonary disease (COPD, emphysema, or asthma) and
medically managed diabetes. Other medical characteristics were consistent with profiles
of people with systolic HF: three quarters were hypertensive, almost three-quarters had
coronary heart disease, and over one-half had a history of myocardial infarction and
heart surgery. Except for age and gender, the participant medical profile was consistent
with that of patients in the ADHERE database, a large multicenter registry of patients
hospitalized for decompensated heart failure (ADHERE, 2004).

Participants’ beliefs about HF in the present study were inaccurate with current
medical and nursing science. Those participants with more accurate beliefs were younger
and older, better educated, and Caucasian. Accuracy of HF illness beliefs did not predict
Diet SE or any factor of Diet SE. In asymptomatic or mildly symptomatic participants
with HF, no association was found between accuracy of HF illness beliefs and Diet SE.

Participants had a low level of objective cues of HF seriousness; e.g., about one-
third of the possible total score. Other studies showed that hospitalization, physician
specialty (Ni et al., 1999), and symptom severity (Rockwell & Riegel, 2001) were
associated with self-care; however, there are no studies in the literature that specifically
linked these and other objective cues of HF with Diet SE or self-efficacy for any specific
behavior. Although supported by the literature, objective cues of HF severity, alone or in combination, were not predictors of Diet SE or of the three factors of Diet SE in this study.

Fewer than 25% of participants had a medical chart history of depression, yet 47% had mild to severe depression when tested by *Nine Symptom Checklist (PHQ-9)* survey. Of participants testing positive for depression, moderate to severe depression occurred in 21% of the sample, reflecting that these participants had less depression than found in other community studies of depression in HF (Rumsfeld et al., 2003; Skotzko et al., 2000). Even though depression did not occur at an intense level for most participants who tested positive, depression was a strong predictor of weakened resistance to relapse for Diet SE and predicted weakened total Diet SE.

When the three predictors: accuracy of HF illness beliefs, objective cues of HF severity, and depression were combined and studied simultaneously to assess if together they predicted Diet SE, the hypothesis was partially supported. That is, the model predicted perceived ability to resist relapse for Diet SE, but not total Diet SE, reducing salt for Diet SE, or behavioral skills for Diet SE. Even though significant, the total variance of this model’s affect on resisting relapse for Diet SE was small.

The following prespecified variables were used as controls in the Common Sense Model to determine their moderating influence on Diet SE: age, race, gender, someone to confide in, comfort living on family income, marital status, education level, and history of diabetes mellitus, asthma, COPD, and atrial fibrillation. Using Pearson Product Moment Correlation, only age, someone to confide in, and medically managed diabetes were significant predictors of total Diet SE and some factors of Diet SE. When these
three moderator variables were controlled in multivariate regression, the original relationship between the combination model and resisting relapse for Diet SE did not hold due to the effect of someone to confide in but were held when age and medically managed diabetes were entered.

Since depression was the only significant predictor variable of total Diet SE by correlation analyses, multivariate regression analyses were conducted to assess the individual effect of depression on total Diet SE when control variables were entered in the combination model predicting total Diet SE. Depression was no longer significant except in patients with medically managed diabetes. When used as control variables, age and someone to confide in removed the original statistically significant relationship between depression and total Diet SE. In similar analyses of resisting relapse for Diet SE as the outcome variable, depression continued to hold as a significant predictor variable of resisting relapse for Diet SE when controlling for prespecified control variables that were significantly associated with depression by bivariate correlation.

Comparison of Results with Previous Literature

In the present study, participants overall had inaccurate HF illness beliefs. Participants with accurate beliefs had mean scores that were close to the cutoff that separated accurate from inaccurate scores, reflecting that even though technically accurate, participants HF beliefs were close to being inaccurate. Based on participant’s low level of accuracy of HF illness beliefs, there are multiple explanations for the lack of association of accuracy of HF illness beliefs to Diet SE.

First, participants were uneducated in HF illness beliefs that reflect current medical and nursing science. Participants had an inaccurate (episodic) view of HF and
those with a stronger episodic view for certain beliefs (e.g., HF comes and goes and HF therapies work best when symptoms are present) perceived they had greater confidence in following their diet. Participants used symptoms and sensations to judge when they should follow their HF diet and had a weak understanding of silent processes of HF. This was illustrated by inaccurate mean item scores for *HF can occur silently without signs or symptoms* and *HF requires me to drink fluids, especially when I feel thirsty*.

The Common Sense Model of Illness framework states that overall understanding of HF (based on beliefs of the attributes of a HF representation) affects participation in self-care. In the present study, patients scored highest (most accurately) in beliefs that HF *is a threat to my health* and *can be disabling*. These are both broadly worded and reflect a general theme that HF is a serious condition. However, an implicit belief that HF is a serious condition was not enough of a threat to prompt coping through diet. This finding could be due to lack of education and understanding about real threats of HF (poor prognosis and chronic condition that progressively worsens). Believing HF to be serious and actually understanding what that means may be two separate phenomena. For example, during telephone conversations, some participants commented that their arthritis (and other medical conditions) was more bothersome than their HF.

The literature provides evidence that patients’ overall understanding of cardiac disease and HF is inaccurate (Horan et al., 1999; Horowitz, et al., 2004; Shifren, 2003). Findings from the present study add to the current literature on inaccurate beliefs and provide new evidence that patients do not develop an adequate or sustained HF threat or danger to prompt coping through Diet SE.
A second explanation could be that participants implicitly knew that HF was a serious condition, but did not truly understand when and how to control it by self-care behaviors, including diet. In other words, the depth and breadth of accurate identity, timeline, consequences, and control attributes that make up a HF representation were insufficient to prompt a threat that required coping and thus were not associated with perceived Diet SE. This was illustrated by reviewing the mean scores of two items: *can get worse by my lifestyle behaviors or actions* had a mean score reflecting an accurate belief and *is an illness that I cannot influence by my behavior* had a mean score reflecting an inaccurate HF belief. Participants believed they could make their HF worse by lifestyle actions, but they did not believe that they could control their HF with specific behaviors. Since neither illness belief was associated with Diet SE, it is likely that behaviors that make HF worse were interpreted as non-diet behaviors; such as, forgetting to take medicines or over-exercising.

The literature provides evidence that patients’ overall understanding of HF is inadequate (Horowitz et al., 2004; Luniewski et al., 1999; Rogers et al., 2000; Russell et al., 1998; Winters, 1999). These same themes were exemplified in a recently published qualitative study of patients with symptomatic HF (NYHA FC II to IV) that focused on patient factors to effective self-management. Using the Common Sense Model of Illness, researchers identified that patients did not have adequate information about HF representation attributes as one of three dominant themes (Horowitz et al.). In addition, researchers commented that nearly all 19 patients knew they needed to restrict dietary sodium but they did not realize that a low sodium diet would minimize or prevent HF symptoms; rather they thought the diet was meant to reduce blood pressure. Some
patients only limited salt when they were edematous; they were less compelled to follow a low sodium diet when they were asymptomatic (Horowitz et al).

Common Sense Model research in diet and other behaviors further substantiates the notion that inaccurate and inadequate HF beliefs affect behavior. Lau et al (1989) found that people with strong identity and cure/control attributes of their illness representation were more likely to seek physician care when they were feeling ill and when asymptomatic. In patients with osteoarthritis, Hampson et al. (1994) found that understanding of symptoms and seriousness (identity attributes) were related to self management. In hypercholesterolemic patients with an elevated fat consumption, accurate illness representations at baseline were associated with greater diet modification over time (Coutu et al, 2003). In the present study, results demonstrated a lack of breadth and depth of HF knowledge, yet, most participants had confidence in Diet SE. Thus, Diet SE could have been based on inaccurate HF beliefs and other factors. It is important to learn if the association between HF illness beliefs and Diet SE would change significantly after an education intervention aimed at promoting HF representation accuracy, breadth, and depth.

Third, patients with HF may need more education on HF diet principles and tools that strengthen Diet SE. Of the three factors comprising Diet SE, participant’s confidence was highest for reducing salt. Patients may not understand that 77% of sodium in foods is not for a salty taste; rather it is used as a preservative or to give food its crispness (Albert, 2005). Participants might have confidence they are following their diet, but if that confidence is based on faulty thinking, study results could have been affected. During telephone survey completion, participants frequently commented that they did not know
what MSG was or that Chinese food had a lot of sodium. Participants verbalized confidence in reading food labels, but some made comments that, while confident that they could do so, they seldom read labels.

It is unknown if inadequate low sodium diet education (especially cognitive education about hidden sodium and tricks to resist relapse and behavioral education in low sodium diet skills) could explain the lack of association in variables. In Horowitz et al. (2004) qualitative study of patients with symptomatic HF, researchers found that patients did not have adequate tools to respond to changes in signs or symptoms that reflected worsening condition. Thus, knowledge of diet principles and behavioral skills that facilitate optimal low sodium diet are a first step in linking illness beliefs with diet. Role modelling and other self-efficacy strengthening techniques need to be studied when developing a diet course to provide the best hope for strengthening Diet SE and ultimately, adherence to low sodium diet. When researchers used the Common Sense Model as the framework for patient education in 61 people with cancer pain, pain-related beliefs and management behaviors related to pain medications and dealing with side effects from medications were altered. Patients that accepted the altered representation of pain control after education were more likely those with greater pain; thus seriousness of symptoms affected outcomes (Donovan & Ward, 2001).

The present study is the first to link the concepts of accuracy of HF illness beliefs and Diet SE together. In this study, accuracy of low sodium diet knowledge was not tested; therefore, Diet SE could have been based on inaccurate knowledge or a basic understanding of eliminating “salty” tasting foods and a salt shaker from the diet, but the true depth and breadth of participant knowledge of diet expectations may have been
limited. In addition, the literature on predictors of HF self-care is generalized and not specific to predictors of low-sodium diet behaviors or Diet SE. Future intervention research of low-sodium diet and of the attributes of HF representation should focus first on promoting accurate knowledge and understanding of each. In this way, it will be possible to determine if the psychologically objective, cognitive processing of the illness threat by accuracy of illness beliefs truly promotes coping by strengthened Diet SE.

Many researchers using the Common Sense Model found strong association between symptoms and behavior (Bishop et al., 1987; Hampson et al., 1994; Lau et al., 1989; Meyer et al, 1985). In addition, patients had higher certainty for illness representations when the condition had more severe symptoms and was seen as a greater threat (Bishop et al.). One explanation for this is that in the Common Sense Model, symptom information that forms a representation is highly concrete and can trigger a danger or threat (Leventhal et al., 1980). An inherent problem in HF is that the most common symptoms (shortness of breath, fatigue, and swelling in ankles and legs) are not concrete. There may be multiple reasons for common symptoms, especially in the elderly and in those with other chronic medical conditions; thus, patients may not interpret their symptoms as a threat and danger and may not develop coping strategies.

The lack of association of objective cues of HF severity and Diet SE can be explained by results of Horowitz et al. (2004) qualitative study. Researchers found that patients did not connect their illness label, HF, to their signs and symptoms; thus, their HF representation lacked depth. Researchers also found that patients could not explain what caused the symptoms that they were recently treated for; thus, their HF representation also lacked breadth. Some patients believed that symptoms were linked to
external forces, such as stress. Patients did not recognize, interpret, or address escalating HF symptoms. Ultimately, symptoms did not trigger a meaningful response related to actions. Symptoms were seen as vague, bothersome, and of low importance. Patients did not perceive the need to seek help. Patients thought it was their physician’s responsibility to control symptoms; very few patients actually believed they could control their symptoms. Of most interest was that failure to develop, execute and evaluate actions (as prevention or in response to an acute threat) was associated with HF itself. These same patients were able to discuss identity and control attributes associated with symptoms of other chronic conditions such as chest pain or diabetes, and they understood the course of action needed to decrease the illness threat (Horowitz et al.).

In the present study, symptoms (functional status) were one of five objective cues of HF severity that were predicted to be associated with Diet SE. While other research does not include the non-symptom objective cues included in the present study, themes that emerged in Horowitz et al. (2004) qualitative study could explain the present study’s findings. In the present study, participants completed questionnaires from home, thus the overall threat of HF might have been perceived as less severe. Perceptual information (objective cues) are processed with conceptual information (accuracy of illness beliefs) to construct a HF representation and give HF meaning. In addition to a low or stable level of HF threat when completing the questionnaire, inaccurate illness beliefs that reflect an episodic model and poor depth and breadth of HF information could have further decreased the threat of HF and led to the lack of association of objective cues with Diet SE. Prior illness experiences play a large role in formulating a representation (Meyer, et al., 1985). Most patients in this study were not recently hospitalized for HF and may not
have prior HF experiences that formulated a great enough threat to prompt ongoing coping. Alternately, the lack of association between objective cues of HF severity and Diet SE could be that participants who believed they were closer to death because they had disability and bothersome symptoms could also have believed that their condition was beyond bothering with diet.

Participants may not have accurately interpreted type of physician practice, participation in a research study, and cardiac transplant evaluation or enlistment as cues of HF seriousness or HF progression. This inaccurate interpretation could occur if participants misinterpreted the importance of functional status (symptoms) or hospitalization as meaningful cues specifically related to HF progression and seriousness. Of the five cues in this study, only cardiac transplant evaluation or enlistment disrupts everyday life on a chronic basis and only for people who wait by the phone for an organ donation call due to psychological or physiological distress. The other cues are intermittent reminders of HF severity, even type of physician practice, since in this study participants often had more than one medical physician managing their HF depending on their HF etiology and if they were recently hospitalized. Since functional status fluctuates based on many factors, is not highly concrete, and was not associated with Diet SE, it is plausible that a call to action was not raised in participants that had other cues. Overall, the intermittent nature of objective cues might not provide a constant reminder of the severity of HF and the need for self-efficacy in diet or other behaviors.

In the present study, participants that were evaluated or listed for cardiac transplantation or were in a research study received care from a HF specialist; thus, any participant who received care from a HF specialist may have believed their HF was
severe but may also have believed it was the physician’s responsibility to treat. Similar to issues raised with the accuracy of HF illness beliefs, education may be the missing link (De Geest et al., 2003). Participants may not understand how symptoms (and hospitalization due to worsening symptoms) of HF affect progression, let alone the silent processes that can promote progression. Likewise, they may not understand how self-care behaviors can mediate symptoms and hospitalization (and the need for being involved in a research study or being assessed for cardiac transplantation). Another explanation could be that there were other factors that were not studied (e.g., home food shopper and chef’s knowledge) that were related to Diet SE, especially since most participants had a strong Diet SE.

These results, in conjunction with qualitative knowledge from Horowitz et al. (2004) on symptoms of HF, raise awareness of the lack of interplay between symptoms and other objective cues of HF and self-care, including low-sodium diet and in this study, Diet SE. There are no other references in the literature that demonstrated these results. Objective cues of HF were variable. In relation to a cognitive HF representation that forms the level of threat, danger and vulnerability to direct coping, patients’ perceptions of objective cues in HF are not well understood. Objective cues, most importantly symptoms and hospitalization, require further study; especially related to interventions that increase meaning and accuracy of interpretation for patients.

In asymptomatic or mildly symptomatic participants with HF, lack of association between accuracy of HF illness beliefs and total Diet SE or in each of the factors of Diet SE could be explained by the high prevalence of inaccurate (episodic) views of HF. Even when overall beliefs about HF were accurate, the depth and breadth of knowledge of the
attributes that comprise a HF representation as an illness threat may still be weak. An alternative explanation is that these asymptomatic or mildly symptomatic participants, similar to the entire cohort, knew they needed to be on a low sodium diet and they truly felt confident of following their diet recommendations, but they did not have adequate knowledge about low sodium diet principles of reducing salt and resisting relapse and were not knowledgeable or had limited practice in carrying out behavioral skills that truly reflected diet adherence. Thus the lack of association between illness beliefs and Diet SE could be due to a combination of knowledge and behavioral skill practice in everyday life. As a first step in validating the impact of the Common Sense Model of Illness framework in this patient population, it is important to learn if depth and breadth of accurate conceptual HF representation information and accurate interpretation of symptoms, including lack of symptoms, promotes Diet SE. Another explanation is that there were other factors, not studied in this research, that predict Diet SE in patients with mild HF.

To date, there is no published literature of research that links depression to weakened Diet SE. In this study, when mean HF illness beliefs scores were reviewed in participants categorized by level of depression, as depression increased, the accuracy of illness beliefs improved. Participants with no depression to mild depression had an inaccurate HF illness beliefs mean score and those with severe depression had accurate HF illness beliefs and the highest mean score when grouped by level of depression. Thus, the findings in this study provide evidence that when HF is believed to be a great danger or threat (cognitive processing of HF representation stimuli as high symptoms and more
accurate illness beliefs) and feeling states to manage the emotional threat are ones that prompt depression, unhealthy coping is promoted.

In the present study, unhealthy coping is equated with weakened total Diet SE and weakened ability to resist relapse for Diet SE. Even though participants in this study had inaccurate HF illness beliefs (an episodic model of HF); participants who were depressed had accurate illness beliefs (a holistic model of HF), especially those related to identity and consequences HF attributes. These illness beliefs created a valid and believable danger that prompted depression. After myocardial infarction, patients that had beliefs that the myocardial infarction had major consequences had the strongest and most consistent relationship to functional disability (Shaw, 1999). The psychological distress in Shaw’s study was not due to anxiety; rather, it was due to illness experiences and generalized illness information obtained from many sources. In a study of patients with multiple sclerosis, those with accurate identity, timeline, and consequences attributes and an inaccurate cure/control attribute had more depression (Vaughan et al., 2003). In addition, these attribute findings were associated with decreased physical functioning (Vaughan). The association of illness belief accuracy and depression in the multiple sclerosis group mirror the results of the present study. While the evidence presented above does not provide a direct connection to weakened Diet SE in depressed patients with HF, it does raise a possible connection between accurate illness beliefs, especially consequences, and maladaptive coping that could explain weakened Diet SE. In the present study, the control attribute was inaccurate (no matter the level of depression) and reflected the lowest mean score of the four attributes of HF representation studied. In depressed patients, the low mean score for control and high mean score for consequences
attributes could have influenced goals for coping related to diet and led to weakened confidence in resisting relapse for Diet SE and for total Diet SE.

Even though the level of depression in the present sample was low when compared to other ambulatory studies of patients with HF (Rumsfeld et al, 2003), and even though depressed patients had more accurate illness beliefs, the negative coping response of weakened Diet SE was strong. This association may be explained by (a) lack of depth and breadth of understanding HF illness beliefs, especially control beliefs that could lead to positive adaptive coping, (b) lack of accurate understanding of HF objective cues, especially symptoms, and how symptoms are related to worsening condition, (c) lack of understanding of specific diet education principles, (d) lack of practical experience in low sodium diet principles, especially hidden sodium, methods to resist relapse, and behavioral skills (e) lack of understanding of the positive impact strengthened Diet SE could have on quality of life, morbidity and other illness beliefs that could affect level of depression, or (f) greater concrete understanding of HF representation that provoked a powerful negative emotional stimulus and maladaptive coping. Alternately, the processes of chronic illness could have a direct or psychological effect on the emotional state that may produce changes in neurotransmitter systems that affect emotion (Leventhal et al., 1984).

In the Common Sense Model, prolonged maladaptive emotions affect coping behaviors. Energy available for action is decreased due to neuroendocrine overstimulation and there is interference with the organization of coping reactions (Leventhal et al., 1984). This could explain the association between decreased exercise and physical functioning in depressed patients with HF (Koenig, 1998; Rozzini et al.,
2002; Rumsfeld, 2003; Tsay & Chao, 2002) and might be the rationale for weakened ability to resist relapse for Diet SE.

As previously discussed, in patients with HF, social isolation predicted hospitalization (Struthers, et al., 2000) and functional impairment (Clarke et al., 2000). Not studied in either report were self-care behavioral predictors of hospitalization and functional impairment to learn if social isolation acted independently or was a mediator to either outcome. Low sodium diet nonadherence could have led to worsening symptoms that prompted hospitalization and functional decline. In the present study, participants with someone in whom to confide were less depressed. The relationship between depression and total Diet SE no longer held when controlling for someone to confide in.

No studies focused on social isolation as a predictor for Diet SE or diet behaviors in patients with HF. However, in a study of adolescent diabetics, social support from family and friends predicted better diet self-care. When social support was studied further, diabetes illness beliefs mediated the relationship (Skinner et al., 2000). Therefore, the present results should prompt further research on social isolation and depression, since many patients with HF are elderly and are at high risk for social isolation, depression, and hospitalization.

Likewise, diabetes has been a topic in the literature as a condition that leads to HF and one that can worsen outcomes in patients with HF; however, there are no reports in the literature that have previously focused on the relationship of diabetes and low sodium Diet SE or diet behaviors. Those participants with medically managed diabetes reported reduced Diet SE. This could be due to emphasis on a low carbohydrate diet, especially since diabetes is easy to monitor with home glucose testing. Here, patients had few
objective cues of HF severity. These same patients could have had high cues of
hyperglycemia and decided to focus on only one aspect of diet. An alternative
explanation is that diabetes counselors provided better low carbohydrate education advice
than was received related to HF diet. Additionally, participants with inaccurate HF illness
beliefs may have a good understanding of identity, timeline, consequences, and
cure/control attributes of their diabetes condition and felt that diabetes was a greater
health threat than HF. Since diabetes mellitus is a common medical history in patients
with HF, future research in Diet SE or low sodium diet behaviors should include a study
of diabetes so that associations can be replicated and refined as important or incidental.

**Implications for Nursing Research and Practice**

The present study makes several contributions to the literature on predictors
derived from the Common Sense Model of Illness on Diet SE. In other chronic conditions
(asthma, cancer, diabetes, hypercholesterolemia, hypertension, myocardial infarction,
osteoarthritis, and multiple sclerosis), accurate illness beliefs that make up an illness
representation, especially perceptual information (symptoms) that are interpreted as very
serious, led to an illness threat or danger that prompted coping; specifically, self-care
behaviors and recovery from acute illness (Cherrington et al., 2004; Coutu et al., 2003;
Donovan & Ward, 2001; Hampson et al., 1994; Meyer et al., 1985; Vaughan et al., 2003;
Weinman et al., 2000). In the present study, accuracy of conceptual information (illness
beliefs) and number of perceptual cues (objective HF cues of severity) had no association
with Diet SE. Based on the results of this study and combined with results from the
qualitative HF research conducted by Horowitz et al. (2004), new meaning is derived
about patient understanding of HF that provides important implications for nursing.
It is unknown if education geared at raising the level of threat HF holds for patients (such as providing education on timeline and consequences), coupled with education on the cure/control attribute of HF representation (such as exercise, low sodium diet, monitoring for signs and symptoms, and weight monitoring) could actually raise the level of threat of HF and prompt self-care behaviors to decrease the threat. Patients with HF need to better understand the link between diet behaviors as a control attribute of HF representation and morbidity (hospitalization) outcomes. In patients hospitalized with HF, a randomized, controlled study of a one-hour, one-on-one education session provided by a cardiac nurse educator, led to a significant decrease in six-month hospitalization (Koelling et al., 2005). This education intervention included topics related to identity, cause, and control HF representation attributes. For example, cause of HF, rationale for drug therapies, causes of volume overload, the role of dietary sodium and fluid restriction (in addition to diet instructions), rationale for self-care behaviors, and what to do if symptoms worsened were included in the session. In addition, self-care practices were improved at 30 days in the education group for daily weight monitoring, sodium restriction, smoking cessation, and total self-care score (Koelling et al.). Future research that involves education in raising the level of HF threat, understanding the impact of control behaviors, and the details of specific control expectations, could affect association of HF illness beliefs to Diet SE.

Depression has been associated with cardiovascular disease, including patients with systolic left ventricular dysfunction (Jiang et al., 2001; Koenig, 1998; Rozzini et al., 2002; Rumsfeld et al., 2003; Skotozo et al., 2000; Tsay & Chao, 2002; Vaccarino et al., 2001). Most research on outcomes of depression has focused on survival, hospitalization,
and functional decline. This study is the first to show an association between depression and Diet SE. Since depression is prevalent in HF and in this study it affected nearly one-half of participants, multiple strategies need to be undertaken to either decrease its occurrence or curb the morbidity and mortality associated with it.

In HF, self-care is an important aspect of the treatment plan and is known to improve quality of life and decrease hospitalization (Grady et al., 2000). This study enhanced nursing science by demonstrating a positive association in depression and Diet SE and a negative association in accuracy of HF illness beliefs, number of objective cues of HF severity, and Diet SE. Since this is the first study to show association of depression and Diet SE, future research is warranted; e.g., an intervention study aimed at reducing depression would be beneficial. The lack of association of objective cues, especially functional status, to Diet SE was surprising. This finding gives rise to future study to learn if indeed, patients lack depth and breadth of knowledge about symptoms and other objective cues as speculated or if other factors emerge as important. Additionally, the Common Sense Model of Illness as the theoretical framework may not be useful in patients with HF, especially if strategies that enhance understanding of HF representation attributes are not given attention or if increasing accuracy of HF representation attributes are shown to prompt more depression (as this might have been part of the rationale for depression in this study). A major limitation of the Common Sense Model of Illness as used in this study was the high degree of multicollinearity of variables in the model. The multicollinearity reduced the predictive power of the model and thus was a major limitation of the study.
Thus, there are many lessons to be learned based on the results of this study.

Specific research questions are:

1. Does increased understanding of HF control actions (e.g., self-care behaviors) decrease depression, hospitalization, and mortality regardless of (a) other HF representation beliefs and (b) whether asymptomatic or asymptomatic?

2. Does education that increases accuracy of HF illness beliefs also increase Diet SE and diet adherence?

3. Is depression an emotional response to illness threat based on the Common Sense Model of Illness or is it related to other factors that have yet to be studied?

4. What is the best way to increase accuracy of HF illness beliefs?

5. In relation to the identity HF representation attribute, how important is attention to accurate information about asymptomatic worsening of HF on Diet SE and diet adherence?

6. What conceptual information raises the level of illness threat, creating a level of danger that prompts coping? Is the conceptual information different for patients who have mild versus advanced HF? Is conceptual information on symptoms meaningless? Is there an optimal format for delivering conceptual information?

7. Does an education intervention strategy (e.g., attention to teaching behavior skills alone or attention to teaching behavior skills after increasing knowledge of HF illness beliefs) affect Diet SE and diet adherence?

8. Do pharmacologic and nonpharmacologic treatments of depression (a) predict increased hope for the future (consequence attribute) and (b) prompt an increase in self-care behaviors (control attribute)?
9. What education resources and symptoms prompt better understanding of HF illness beliefs?

10. Should depressed patients be given information on HF representation attributes? In depressed patients, is there a communication style that works best to increase understanding of HF representation attributes without worsening depression?

11. Does education content that focuses on a combination of (a) the silent processes of HF and consequences of silent processes, (b) diet as one method to control worsening HF before symptoms arise or get worse, and (c) role modeling of low sodium diet behaviors (especially behavioral skills and ways to resist relapse), increase the association of accuracy of HF illness beliefs to Diet SE?

Nurses are perfect team members to conduct research regarding the questions above since they are primary providers of patient education in HF. Nurses routinely assess patients (including assessment of adherence to the treatment plan, emotional responses to illness and therapies, and understanding of education provided). Nurses must be responsible for assuring that common practices (such as assessment and patient education) are evidence-based.

Since patients with accurate illness beliefs or greater objective cues were not prompted toward greater Diet SE in the present study, future research is needed to learn if the predictor and outcome variables are a bad match, if the theoretical framework is weak, or if indeed, patients are lacking the depth and breadth of HF knowledge, including low sodium diet knowledge and skills, to create a level of threat that prompts coping. Currently, nurses place emphasis on teaching behavioral skills, including teaching diet skills and how to monitor for worsening of HF signs and symptoms. Due to lack of
support for spending too much time on education, it was always felt that education on behavioral skills was the priority to achieve self-care behavior expectations. The results of the present study suggest that nursing attention may be misplaced. Nursing education that ignores content in HF representation attributes, especially the relationship of control attributes to other attributes (e.g., control of HF improves consequences and decreases sensations and symptoms) might be a barrier to effective behavioral adherence and ultimately, a barrier to enhanced patient outcomes.

While more research is necessary to draw conclusions about the clinical usefulness of the theoretical model used in this study, implications for nursing practice related to depression and Diet SE can be promoted. Ambulatory and inpatient nurse clinicians need to assess for depression (e.g., at hospital discharge or annually), especially in patients with worsening functional status. Depression is pharmacologically and non-pharmacologically treatable and patients should not be left to suffer in silence.

The present study provided valuable information for nurses on patients’ understanding of HF and the relationships of accuracy of HF illness beliefs, objective cues of HF severity, and depression on Diet SE. The findings highlight the need for (a) future nursing research, (b) patient education strategies that increase accuracy of patient’s HF beliefs and provide enhanced understanding of how objective cues relate to HF severity, and (c) better assessment and treatment of depression.
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Appendix A.

Conceptual and Operational Variables: Definitions and Tools (as illustrated in Figures 2 and 4)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
<th>Tool Name</th>
<th>Tool description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive (conceptual and perceptual) illness threat imposed by HF</td>
<td>Part of the Common Sense Model of Illness Representation theoretical framework. Processing of HF representation (thoughts, beliefs, or view a person has about HF) influences how a person analyzes and interprets HF. Construction of meanings for HF experiences promotes a level of illness threat (may be low or high) that affects coping actions (Keller, Ward, &amp; Baumann, 1989; Leventhal, Meyer, &amp; Nerenz, 1980).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
<th>Tool Name</th>
<th>Tool description</th>
</tr>
</thead>
</table>
| Cognitive (conceptual) Illness Threat Imposed by HF | Illness threat has two cognitive factors.  
1. Implicit conceptual illness information (knowledge). | 1. Accuracy HF illness beliefs defined as:  
(a) Conformation of patient HF illness beliefs with contemporary HF medical and nursing science, and  
(b) High level of certainty about implicit HF illness beliefs. | 1. *Survey of Illness Beliefs in HF*; self-administered questionnaire | Mean score of a 14 item, Likert type survey of statements that include accurate and inaccurate illness beliefs derived from 4 (of 5) attributes of HF representation (cause omitted).  
Accurate illness beliefs = mean score ≥ 3;  
Inaccurate illness beliefs = mean score <3.  
Level of certainty patients have for individual illness beliefs are based on mean score range of 1 - 4. The higher the mean score, the greater the certainty of accurate beliefs (3.0 or higher). The lower the mean score, the greater the uncertainty (2.99 or less). |
<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
<th>Tool Name</th>
<th>Tool description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive (perceptual) Illness Threat Imposed by HF</td>
<td>2. Perceptual factors of illness severity (signs, symptoms, or everyday common-sense situations of lay people).</td>
<td>2. Objective cues of HF severity that forms identity (ID), timeline (TL), consequences (CONQ), and control (CONT) attributes of HF representation.</td>
<td></td>
<td>Objective cues, (a) physician type, (b) HF hospitalization, (c) research study participation, (d) cardiac transplantation evaluation or enlistment, and functional status are individually assessed.</td>
</tr>
<tr>
<td>2a. Type of physician practice = doctor treating HF. Three options: internal medicine /other non-cardiologist, cardiologist, or HF specialty cardiologist (ID, CONQ, CONT)</td>
<td>2a. 1 question; data from billing record; 3 options</td>
<td>2a. 1 question with weighted number score 1 = internal medicine/other non-cardiologist physician 2 = cardiologist 3 = HF specialty cardiologist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2b. HF hospitalization = hospitalization for HF in the month (30 days) before questionnaire completion (ID, TL, CONQ)</td>
<td>2b. 1 question on Medical Background Survey</td>
<td>2b. 1 yes/no question with weighted number score No = 0; Yes = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2c. History of recent (within 3 months of completing questionnaire) participation in a HF research study (ID, CONT)</td>
<td>2c. 1 question; Data from medical record</td>
<td>2c. 1 yes/no question with weighted number score. No = 0; Yes = 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Operational Definition</td>
<td>Tool Name</td>
<td>Tool description</td>
</tr>
<tr>
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</tr>
<tr>
<td>Cognitive (perceptual) Illness Threat Imposed by HF, continued</td>
<td>2d. Cardiac transplantation evaluation or enlistment (ID, CONQ)</td>
<td>2d. 1 question; data from medical record</td>
<td>2d. 1 yes/no question with weighted number score No = 0; Yes = 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2e. New York Heart Association (NYHA) functional status reflects level that symptoms that impair activities of daily living (ID)</td>
<td>2e. Activity Scale; self-administered questionnaire</td>
<td>2e. 5 questions; a valid, reliable measure of NYHA functional status. Range = 1-4. 1 = No impairment 2 = mild symptoms with activity 3 = moderate symptoms 4 = Symptoms at rest</td>
<td>2a-e scores will be summed Range = 2-13. Higher objective cues score reflects higher HF severity and HF threat.</td>
</tr>
</tbody>
</table>
Appendix A (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
<th>Tool Name</th>
<th>Tool description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression as an Emotional Response to HF Threat</td>
<td>Depression: an adjustment disorder specified as number 309.0 and defined as ‘depressed mood’ by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Used when patients exhibit depressed mood, fearfulness or feelings of hopelessness in response to an identifiable psychosocial stressor (American Psychiatric Association, 1994)</td>
<td>Depression is labeled when the sum score is ≥ 5 via a tool. Depression reflects ≥ 5 depressive symptoms (trouble concentrating; little interest in activities; sleeping too much or cannot fall asleep; slow speech or fidgety; thoughts of death; feeling down, depressed or hopeless; tired; and poor appetite or overeating) that cause significant impairment in social, occupational or other areas of functioning.</td>
<td>Nine Symptom Checklist -also known as Patient Health Questionnaire (PHQ)-9; self-administered questionnaire</td>
<td>Sum score of a 9-item measure of depression presence and severity. Tool score range = 0-27. Depression cut points: 5 = mild 10 = moderate 15 = moderately-severe 20 = severe depression = higher distress that limits ability to form a coping plan that includes diet self-efficacy</td>
</tr>
</tbody>
</table>

Dependent Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
<th>Tool Name</th>
<th>Tool description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Low Sodium Diet Self-Efficacy as a Coping Action</td>
<td>Behaviors that lead patients to adapt to specific health and illness situations. Coping is steered by implicit illness representation. Level of perceived threat set goals</td>
<td>Perceived low sodium diet self-efficacy is a self-belief or confidence that one is capable of carrying out specific low sodium diet behaviors. Self-efficacy influences how</td>
<td>The Low Sodium Eating Behaviors Scale; self-administered questionnaire</td>
<td>Mean total score and mean score of each of 3 factors on a standardized instrument of 29 items.</td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Operational Definition</td>
<td>Tool Name</td>
<td>Tool description</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------</td>
<td>------------------------</td>
<td>-----------</td>
<td>------------------</td>
</tr>
<tr>
<td>Perceived Low Sodium Diet Self-Efficacy as a Coping Action, continued</td>
<td>for coping (Leventhal, Nerenz, &amp; Steele, 1984). Coping actions minimize health-related risks and reduce illness threats.</td>
<td>people think, feel and act and leads to a significant independent effect on behavior performance, even during times of stress (Bandura, 1977). Strengthened self-efficacy for a specific behavior promotes behavior initiation and maintenance. Factor definitions: 1. Resisting relapse: sticking to a diet behavior when challenged by circumstances (finances, food availability, etc.) or people 2. Reducing salt: decreasing the consumption of table salt and sodium found in processed foods 3. Behavioral skills: takes active measures to reduce sodium intake (e.g., reading labels for sodium content)</td>
<td>The Low Sodium Eating Behaviors Scale</td>
<td>Likert type survey of statements that directly assess level of perceived self-efficacy for a low sodium diet. Factor 1: Resisting Relapse, 14 items Factor 2: Reducing Salt, 9 items Factor 3: Behavioral Skills, 6 items. Mean score of 29 items and mean score for each of 3 factors is 1.0-5.0. The patient can choose does not apply; therefore sum scores are not used. Higher mean total score and mean scores in each low sodium diet factor reflect stronger perceived diet self-efficacy for diet behaviors.</td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Operational Definition</td>
<td>Tool Name</td>
<td>Tool description</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Demo-Graphic:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Age: in years</td>
<td>Age, gender, and race: from billing computer</td>
<td>Age: actual age in years</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Race: Caucasian, African American, Asian, Hispanic, other</td>
<td></td>
<td>Race: See operational definition</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Gender-male / female</td>
<td></td>
<td>Gender: 1 = male, 2 = female</td>
<td></td>
</tr>
</tbody>
</table>
| Socio-economic status | Socioeconomic status: a) Someone to confide in family - ordinal scale: never comfortable, very uncomfortable, < comfortable, comfortable, very comfortable | a) *To Help Us Understand You Survey, #2*  
  b) *To Help Us Understand You Survey, # 5* | Social connection: 1 = Yes, 2 = No                                                     | See operational definition                                                  |
| Marital status      | Marital status - ordinal scale: single, married, widowed, divorced, separated, unknown/other | Marital status: From billing computer                                                  | Marital status: See operational definition                                  |                                                                                |
### Appendix A (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
<th>Tool Name</th>
<th>Tool description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational level</td>
<td>Education level- highest level completed - ordinal scale</td>
<td>Education level: <em>To Help Us Understand You Survey, # 3</em></td>
<td>Education level: See operational definition</td>
<td></td>
</tr>
<tr>
<td>Medical History</td>
<td>History of medical conditions that cause symptoms mimicking HF (fatigue, dyspnea, exercise intolerance, palpitations)</td>
<td>Medical conditions: medically managed diabetes mellitus, chronic obstructive pulmonary disease, asthma and atrial fibrillation</td>
<td>Medical history: <em>Medical History Chart Review Form</em></td>
<td>Medical conditions history: 1 = Yes, 2 = No</td>
</tr>
</tbody>
</table>

Note. HF = heart failure.
Appendix B  

**Medical Background Survey**

**Directions:** Please answer the following questions as closely as they relate to your medical history of heart failure as well as a history of alcohol and smoking. Write in or mark your answer on the lines provided by each question.

1. When were you diagnosed with heart failure? _______ Year _______ Month

2. Have you been hospitalized in the last 30 days for heart failure? _______ Yes _______ No

3. Have you been hospitalized in the last 30 days for any reason? _______ Yes _______ No

4. Smoking history:
   - _______ Current smoker (smoked within last month)
   - _______ Recent (stopped smoking – longer than 1 month but less than 1 year)
   - _______ Former (stopped more than 1 year before today)
   - _______ Never smoked

5. On average, how often do you drink alcoholic beverages (beer, wine, or liquor)?
   - _______ Never
   - _______ 1 or fewer alcoholic drinks per week
   - _______ 2 – 7 drinks per week
   - _______ 8 or more alcoholic drinks per week

6. Based on how you feel today, how would you rate your health:
   - _______ My heart condition has made it impossible for me to live as I would like to.
   - _______ My heart condition makes it difficult for me to live as I would like to.
   - _______ My heart condition sometimes interferes with allowing me to live as I would like to.
   - _______ My heart condition rarely prevents me from living as I would like to.
   - _______ My heart condition never prevents me from living as I would like to.

7. Recent activity and exercise history:
   During the past week (even if it was not a typical week), how much total time did you spend on EXERCISE (including strengthening exercises, walking, swimming, gardening, active housework or other types of aerobic exercise)?
   - _______ None
   - _______ Less than 30 minutes per week
   - _______ 30 – 60 minutes per week
   - _______ More than 1 hour and up to 3 hours per week
   - _______ More than 3 hours per week

8. List your Height (Feet and inches) _____________ & Weight (pounds): _____________

Thank you. You are finished with this survey. Go to the survey with the # 2 in the upper right corner.
Appendix C  Survey of Illness Beliefs in Heart Failure

Directions: This survey provides 14 statements that might describe what heart failure means to you, including your beliefs and understanding about heart failure. The purpose is to learn what you believe about heart failure. Read each statement then circle the best response:

**strongly disagree (SD)**  **disagree (D)**  **agree (A)**  **or**  **strongly agree (SA).**

Choose *strongly* disagree or *strongly* agree if you are very certain that the statement is something you believe.

Answer each statement as best as you can. It is important for you to respond to each statement based on your actual beliefs and not on how you think you should respond to each statement.

<table>
<thead>
<tr>
<th>Heart failure….</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.   Is an illness that I cannot influence by my behavior.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>2.   Is something I go “in” and “out” of.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>3.   Is present only when symptoms are present.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>4.   Can be cured with drugs and other therapies.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>5.   Requires me to drink fluids, especially when I feel thirsty.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>6.   Can occur silently (without signs or symptoms).</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>7.   Is likely to shorten my life (cause premature death).</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>8.   Drugs work best when I have symptoms.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>9.   Can get worse by my lifestyle behaviors or actions.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>10.  Can be disabling.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>11.  Is a threat to my health.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>12.  Needs treatment even if I feel fine.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>13.  May improve with drugs and a lot of time.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>14.  Plan of care (drugs, diet…) must be followed forever.</td>
<td>SD</td>
<td>D</td>
<td>A</td>
<td>SA</td>
</tr>
</tbody>
</table>

Thank you for completing this survey.

Go to the survey with the # 3 in the upper right corner.

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Appendix D  Activity Scale

Directions:
This scale will help us learn how much exercise and activity you are capable of. Answer questions based on your activity in the last 30 days.

Start with # 1 and then follow the messages under the YES or NO to move through this scale. When your message is “stop”, that means you are finished and do not need to read any further. Place an “x” in the box next to the word “stop”. You are finished.

1. Can you walk down a flight of steps without stopping?  
   YES  
   NO  
   Go to # 2  
   Go to # 4

2. Can you do any of the following?  
   a. carry anything up a flight of 8 steps without stopping  
   b. have sexual intercourse without stopping  
   c. garden, rake or weed  
   d. roller skate or dance foxtrot  
   e. walk at a 4 miles-per-hour rate on level ground?  
   YES  
   NO  
   STOP
   Go to # 3

3. Can you do any of the following?  
   a. carry at least 24 pounds up 8 steps  
   b. carry objects that are at least 80 pounds  
   c. do outdoor work- shovel snow, spade soil  
   d. do recreational activities such as skiing, basketball, 
      touch football, squash, handball  
   e. jog or walk 5 miles-per-hour?  
   YES  
   NO  
   STOP  
   STOP

4. Can you do any of the following?  
   a. shower without stopping  
   b. strip and make a bed  
   c. mop floors  
   d. hang washed clothes  
   e. clean windows  
   f. walk 2.5 miles per hour  
   g. bowl  
   h. play golf (walk and carry clubs)  
   i. push power lawn mower?  
   YES  
   NO  
   STOP  
   STOP  
   Go to # 5

5. Can you dress without stopping because of symptoms  
   YES  
   NO  
   STOP  
   STOP

Thank you for completing this survey.  
Go to the survey with the # 4 in the upper right corner.

Goldman, Hashimoto, Cook and Loscalzo; Circulation 1981;64:1227.
Appendix E  The Low Sodium Eating Behaviors Scale

Directions. This survey gives statements about heart failure low SODIUM (SALT) diet beliefs. There are no right or wrong answers. Everyone has different experiences that will influence how questions are answered.

Each statement begins with ‘I have confidence that I can…’. After you read each diet statement, please circle the letter abbreviations that best describes your confidence for sticking to the diet statement: “Sure I Could Not Do It” (SN), “Think I May Not Be Able to Do It” (MN), Neutral - means that your confidence in sticking to the diet statement comes and goes (N), “Think I May Be Able To Do It” (MA), or “Sure I Can Do It” (SC). If the statement does not apply, choose the ‘does not apply’ (NA) category. Only circle one choice for each diet statement.

It is important for you to answer according to your actual beliefs and not according to how you feel you should believe or how you think I want you to believe. Please give answers that best explain how you feel.

<table>
<thead>
<tr>
<th>I have confidence that I can.....</th>
<th>Sure Not</th>
<th>May Not</th>
<th>N</th>
<th>May Able</th>
<th>Sure Can</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stick to low-salt foods when I feel depressed, bored, or tense</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>Stick to low-salt foods when there is high-salt food readily available at a party</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>Stick to low-salt foods when dining with friends or co-workers</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>Stick to low-salt foods when the only snack close by is available from a vending machine</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>Stick to low-salt foods when I am alone and there is no one to watch me</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>Stick to low-salt foods when I am not up to preparing something else</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
</tbody>
</table>

Go to next page
<table>
<thead>
<tr>
<th></th>
<th>I have confidence that I can.....</th>
<th>Sure</th>
<th>Not</th>
<th>May Not</th>
<th>Be Able</th>
<th>To Do It</th>
<th>Neutral</th>
<th>May</th>
<th>Be Able</th>
<th>To Do It</th>
<th>Sure</th>
<th>Can</th>
<th>Do It</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Stick to low-salt foods when I have guests staying in my home</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>8.</td>
<td>Stick to low-salt foods when somebody offers me a high-salt food at a party</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td>9.</td>
<td>Stick to low-salt foods when someone eats a high-salt food right in front of me</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
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<tr>
<td>10.</td>
<td>Stick to low-salt foods when I must eat in a hurry</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td>11.</td>
<td>Stick to low-salt foods while traveling</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td>12.</td>
<td>Stick to low-salt foods while I am drinking alcohol</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>13.</td>
<td>Eat carrots, celery and raw vegetables instead of dips, crackers and potato chips for snacks</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td>14.</td>
<td>Drink fewer diet drinks with sodium</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>15.</td>
<td>Add less salt than the recipe calls for</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td>16.</td>
<td>Eat unsalted peanuts, chips crackers and pretzels</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Avoid adding salt at the table</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Eat unsalted, unbuttered popcorn</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Use less meat in casseroles than the recipe calls for</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Keep the salt shaker off the kitchen table</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Buy fewer high-salt snack items (chips and pretzels)</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Decrease salt intake by substituting other spices in cooking</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Go to next page
<table>
<thead>
<tr>
<th>I have confidence that I can.....</th>
<th>Sure</th>
<th>May Not</th>
<th>Neutral</th>
<th>May Be Able To Do It</th>
<th>Sure I Can Do It</th>
<th>Does Not Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Eat low salt cereals</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>24. Read labels for salt content</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>25. Serve low-salt food to dinner party guests in my home</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>26. Keep a food diary for 1 week if I begin to slip in my low salt food program</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>27. Say encouraging things to myself if I begin to slip in my low salt food program</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>28. Keep problematic high-salt foods out of sight, if purchased</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
<tr>
<td>29. Ask my waiter not to add MSG to Chinese food</td>
<td>SN</td>
<td>MN</td>
<td>N</td>
<td>MA</td>
<td>SC</td>
<td>NA</td>
</tr>
</tbody>
</table>

Thank you for completing this survey. 
Go to the survey with the # 5 in the upper right corner.

Adapted from Sallis et al. Health Education Research 1988;3:283
Appendix F

Nine Symptom Checklist

Directions: Over the last 2 weeks, how often have you been bothered by any of the following problems? Circle your answer.

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days (8 or more days)</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Little interest or pleasure in doing things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Feeling down, depressed, or hopeless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Trouble falling or staying asleep, or sleeping too much</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Feeling tired or having little energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Poor appetite or overeating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Trouble concentrating on things, such as reading the newspaper or watching television</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Thoughts that you would be better off dead or of hurting yourself in some way</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

If you circled # 1, 2 or 3 for any of the questions, how difficult has it been for you to do your work, take care of things at home, or get along with other people? Check the box that best answers the question.

Not difficult at all Somewhat difficult Very difficult Extremely difficult

Thank you. You are done with this survey. Go to the 6th and final survey of this packet

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Appendix G  

To Help Us Understand You Survey

Directions: These questions will help us understand more about you so that we can interpret the information you have provided in other surveys. Would you please answer the following questions?

1. Do you currently live with another person(s)?  _____ Yes  _____ No
2. Do you have someone to confide in?  _____ Yes  _____ No
3. What is the highest level of education you have completed?
   1. _______ 8th grade or less
   2. _______ 9-12th grade
   3. _______ High school graduate
   4. _______ Business school
   5. _______ 1-3 years of college
   6. _______ Associate degree (2 year college degree)
   7. _______ Bachelor’s degree (4 year college degree)
   8. _______ Master’s degree
   9. _______ Doctoral degree
4. Work status:
   0. _______ Work full or part time outside the home
   1. _______ Unemployed by choice
   2. _______ Sick leave or disability
   3. _______ Homemaker
   4. _______ Retired due to heart failure
   5. _______ Retired; NOT due to heart failure
   6. _______ Other (specify __________________________)
5. Consider how well your household lives on its income. Financially, would you say you are:
   1. _______ Never comfortable in making ends meet; have to depend on others to help financially
   2. _______ Very uncomfortable; rarely have enough to make ends meet
   3. _______ Less than comfortable; sometimes do not have enough to make ends meet
   4. _______ Comfortable; have enough to make ends meet
   5. _______ Very comfortable; have more than enough to make ends meet.
6. Do you have health care insurance *in addition to* Medicare or Medicaid?  
   _____ Yes  _____ No

7. Do you feel your insurance covers you adequately?  
   _____ Yes  _____ No

8. Does your insurance pay for your heart failure and other prescription medications?  
   _____ Yes  _____ No

9. Family income range (total gross income for you and others living in your home):  
   1. _____ Under $20,000 / per year  
   2. _____ $20,000 to $49,999 / per year  
   3. _____ $ 50,000 to $75,000 / year  
   4. _____ Over $ 75,000 / year

THANK YOU!

You have completed all 6 surveys.

- Please review each page to be sure you answered all the questions.
- When done, fold the packet in half.
- Place the folded packet in the pre-stamped, pre-addressed envelope and mail them by ____________________________.

If you have any questions about statements that were addressed in these surveys or wish to discuss this project further, please contact:

Nancy Albert M.S.N., R.N.  
9500 Euclid Avenue M-13  
Cleveland, Ohio 44195

Local telephone: 216-444-2200 or Toll free: 1-800-223-2273  
Ask operator to page me at pager number 24930
Appendix H  

Medical History Chart Review Form

Research Number: ___________        Date: _____ /______ /2004

1. Heart failure etiology:
   1. ischemic (heart disease)
   2. idiopathic (Unknown cause)
   3. hypertension (High blood pressure)
   4. valvular heart disease (Mitral or aortic valve dysfunction)
   5. alcoholic
   6. postpartum (Developed heart failure within 2 months of giving birth)
   7. other (please specify)_____________________

2. LVEF: ____%   Cath___ Echo___ Muga___ Date____________

3. Does patient have any of the following comorbidities/medical history:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial Infarction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary Artery Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percutaneous Cardiac Intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac catheterization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CABG or valve surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RV Pacemaker (VVIR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>RV+RA pacemaker (DDD)</td>
<td></td>
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<td></td>
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<tr>
<td>Bi-Ventricular Pacemaker</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventricular tachycardia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implantable Cardioverter-Defibrillator</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Renal insufficiency (creatinine &gt; 2 mg/dL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer: skin/leukemia/lymphoma</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer: other areas-no metastasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer-other areas with metastasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression (inclusion criteria met)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

4. Has patient ever been evaluated or listed for heart transplant? YES ☐ (3) NO ☐ (0)

5. Is patient currently (or within the last 3 months) been in a research study YES ☐ (2) NO ☐ (0)
Appendix I: Content Validity of the Survey of Illness Beliefs in Heart Failure Tool

1. Review of literature to identify content domain specific to the attributes of illness representations as it applied to heart failure (HF). Qualitative studies in the literature provided content on the experience of living with HF and quantitative studies provided content about illness beliefs as a predictor of self-care behaviors (Evangelista, Kagawa-Singer, & Dracup, 2001; Luniewski, Reigle, & White, 1999; Mahoney, 2001; Ni et al., 1999; Rockwell & Riegel, 2001; Rogers et al., 2000; Stull, Starling, Haas, & Young, 1999; Wehby & Brenner, 1999). These studies, along with content on accurate (consistent with contemporary medical and nursing science) illness beliefs about HF (American College of Cardiology/American Heart Association Task Force, 2001) and content from a valid, reliable quantitative scale on illness representations (Turk, Rudy, & Salovey, 1986), were used to identify domain content.

2. Tool items identified and created from the content domain for the instrument. Attention was paid to providing sufficient coverage of all areas of the content domain and wording statements to be both accurate and inaccurate.

3. The instrument was developed and assembled. It contained a list of 31 statements that reflected accurate and inaccurate common sense illness beliefs about HF. The rating scale for each statement was on a 4-point scale. The rating does not include categories for ‘not applicable’, ‘sometimes’ or ‘unknown’ to eliminate the chance of ambivalent responses.
4. The survey was sent to 9 HF specialty cardiologists (experts) at Cleveland Clinic Foundation to determine if each item was content valid and if the entire instrument was content valid. Specific instructions on how to rate items and background information about the concept, illness representation, were provided. Seven physicians responded and provided feedback. All seven physicians endorsed the instrument as content valid. Of the individual scale items, only those that were deemed content valid by at least six of seven experts (0.86 to 1.00) remained. In this way, item endorsement would establish content validity beyond a 0.05 level of significance (Lynn, 1986). No individual scale item was rated irrelevant. Suggestions were made for combining two statements that had similar themes into one statement and for adding new statements. The experts provided feedback on changes in wording of the instructions (to simplify) and individual statements (to decrease the reading level). One physician provided a letter of strong support for conducting this research.

5. To ensure content validity, an administrative pilot was completed of the revised tool. Twelve HF registered nurses (RN) whose patient population was HF, including three master’s prepared RNs, completed the questionnaire, timed how long it took to complete, and provided endorsement information about each item and the tool as a whole. By having RNs respond to each item using the 4-point scale, I was able to assess variability in responses to each item and to determine if deviation of mean individual item scores were due to non-decisively worded or unclear statements. Each registered nurse was asked to answer the following questions: “What do you think I wanted you to do?”, “Is the level of language appropriate?”, “Were there any words that were offensive?” and “Did you understand each statement (and if not, provide details)?”.
• All 12 RNs endorsed the instrument as content valid.
• There were no individual scale items rated irrelevant.
• Item scores reflected variability in responses and that these RN’s had accurate HF illness beliefs.
• Minimal suggestions were made for wording changes to decrease the reading level of individual items.
• Time to complete averaged 7-9 minutes.

6. The scale was revised to incorporate comments from the RN reviewers and to strengthen the wording of one statement that appeared to be non-decisive (based on mean RN score and written feedback from one reviewer). The scale of 34 items incorporated both physician and RN comments. Six experts (four physicians and two masters prepared RNs, all HF experts) who participated in the previous content validity reviews were asked to review individual items and the instrument as a whole for content validity a final time.

• The content validity index for each item ranged from .83 (3 items) to 1.00 (4 items). Overall content validity index was .93.
• In one item with a score of .83, 2 experts responded that they “could not assess without revision”. The item was written: causes tiredness and difficulty breathing, but I can live a long life. As this item was revised from the previous survey due to lack of succinctness, it was removed completely from the instrument at this time.

The final instrument of 33 items was used to determine its reliability.
Appendix J: Reliability of the Survey of Illness Beliefs in HF Tool: Exploratory Factor Analysis Results (Analysis conducted by Richard Zeller Ph.D. & Principal Investigator)

Instrument reliability using Cronbach’s standardized item alpha was .85 for the 33 items. We did not expect this tool to have clearly delineated attributes that make up the cognitive, conceptual illness beliefs of an illness representation (REP). In a study that tested an instrument of illness REP attributes in patients with chronic fatigue syndrome and Addison’s disease, researchers found that attributes were not independent; rather they were intercorrelated (Heijmans & de Ridder, 1998). Thus, we wanted to be sure we did not have redundant items. A review of the correlation matrix of each of the 33 items determined that redundancies were present. Thus, factor analysis was used to determine the items that should be retained to reflect accurate and inaccurate systolic heart failure (HF) illness beliefs.

A principal components factor analysis was conducted on the 33 Heart Failure (HF) Representation items. Ten factors had eigenvalues of > 1.0. However, a Scree plot suggested two strong, systematic factors and 2 additional factors that were weak and may have been systematic or random. A 4-factor structure was rotated to a Varimax solution. An examination of the 4-factor structure showed one very strong factor, one moderately strong factor, and two weak factors.
Given this analysis, a 2-factor structure was rotated to a Varimax solution. This 2-factor structure accounted for 31.81% of the variance in the correlation matrix. An examination of the 2-factor structure revealed 28 items with loadings of at least .4 on one of the two factors; 5 items did not load at this level on either factor. These 5 items were dropped from the analysis.

A 2-factor structure using the 28 retained items was rotated to a Varimax solution. This 2-factor structure accounted for 36.20% of the variance in the correlation matrix. An examination of this 2-factor structure revealed that 24 items met one of two conditions: (a) the item had a factor loading of > .5; or (b) the item had a difference in factor loadings between the two factors of > .2. These 24 items were retained in the analysis.

Given this analysis, a 2-factor structure of the remaining 24 items accounted for 38.32% of the variance in the correlation matrix. An examination of this 2-factor structure revealed that items represented both accurate and inaccurate illness beliefs. Accurate HF beliefs were labeled “holistic” and inaccurate beliefs were labeled “episodic” to reflect the content of each. The “holistic” factor was strongly defined by items in all 4 attributes of HF representation that described the patient’s condition in a realistic, accurate perspective (e.g. occurs silently, is a chronic threat to health, and is disabling). The “episodic” factor was strongly defined by items in all 4 attributes of HF representation, but characterized a perspective of HF as a curable condition that comes and goes (as symptoms wax and wane) and is treated mainly with drugs. The episodic factor of HF representation is a typical mental image that patients may have of other chronic medical conditions (flu, arthritis, asthma and chronic obstructive pulmonary
disease) but it is an inaccurate perspective in HF and may explain patient adherence to self-care behaviors in self-management of HF.

For each factor, Cronbach’s alphas for the 7 items that best defined each factor were calculated. This output showed that all 7 “holistic” and “episodic” representation items made a positive contribution to measurement reliability ($\alpha = .87$ and .71, respectively). This 2-factor structure of the remaining 14 items accounted for 48.32% of the variance in the correlation matrix. Appendix J, Figure J.1 provides the 14-item Scree plot and Appendix J, Table J.1 provides factor loadings for the 14 items retained.

Scales were constructed for each factor by summing the responses to the items defining each scale and dividing by the number of items. This resulted in a theoretical range of scores from 1 to 4. A mean score below 3 reflects inaccuracy. Appendix J, Figures J.2 and J.3 present the histograms of each of these scales. The “holistic” scale had a mean of 3.25 (sd = .39). This demonstrated that patients had accurate HF illness beliefs that made up their HF REP, including beliefs that HF can occur silently, it is chronic, can shorten life, cause disability and can be controlled by self-care behaviors. The “episodic” scale had a mean of 2.82 (sd = .41), demonstrating that patients also had HF illness beliefs that were dictated by how they felt (symptoms) and by traditional acute care treatment approaches (taking a pill(s) will fix the problem).
Appendix J.

**Scree Plot**

*Figure J.1.* Scree plot of 14-items retained on the tool.
Appendix J

**Holistic-mean scores**

_Figure J.2._ Histogram of “Holistic” HF Illness Beliefs Scores.
Appendix J.

Figure J.3. Histogram of “Episodic” HF Illness Beliefs Scores.
<table>
<thead>
<tr>
<th>Item number</th>
<th>Attributes</th>
<th>on survey</th>
<th>Item Description: Heart failure illness belief items</th>
<th>Holistic</th>
<th>Episodic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>10</td>
<td>Can be disabling</td>
<td>.857</td>
<td>-.037</td>
<td></td>
</tr>
<tr>
<td>Consequences</td>
<td>11</td>
<td>Is a threat to my health</td>
<td>.846</td>
<td>-.017</td>
<td></td>
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<tr>
<td>Control</td>
<td>9</td>
<td>Can get worse by my lifestyle behaviors and actions</td>
<td>.797</td>
<td>.084</td>
<td></td>
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<tr>
<td>Identity</td>
<td>12</td>
<td>Needs treatment even if I feel fine</td>
<td>.735</td>
<td>.024</td>
<td></td>
</tr>
<tr>
<td>Identity</td>
<td>6</td>
<td>Can occur silently (without signs or symptoms)</td>
<td>.682</td>
<td>.098</td>
<td></td>
</tr>
<tr>
<td>Timeline</td>
<td>14</td>
<td>Plan of care must be followed forever</td>
<td>.661</td>
<td>.279</td>
<td></td>
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<tr>
<td>Consequences</td>
<td>7</td>
<td>Is likely to shorten my life</td>
<td>.626</td>
<td>-.067</td>
<td></td>
</tr>
<tr>
<td>Identity</td>
<td>8</td>
<td>Drugs work best when I have symptoms</td>
<td>.000</td>
<td>.814</td>
<td></td>
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<tr>
<td>Identity</td>
<td>3</td>
<td>Is present only when symptoms are present</td>
<td>.250</td>
<td>.729</td>
<td></td>
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<tr>
<td>Timeline</td>
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<td>Is something I go in and out of</td>
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<td>.591</td>
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<tr>
<td>Control</td>
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<td>Requires me to drink fluids, especially when I feel thirsty</td>
<td>.192</td>
<td>.566</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>1</td>
<td>Is an illness that I cannot influence by my behavior</td>
<td>.006</td>
<td>.559</td>
<td></td>
</tr>
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</table>
Table J.1 continued

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Item number</th>
<th>Item Description: Heart failure…</th>
<th>Holistic</th>
<th>Episodic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consequences</td>
<td>13</td>
<td>May improve with drugs and a lot of time</td>
<td>-.231</td>
<td>.502</td>
</tr>
<tr>
<td>and timeline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consequences</td>
<td>4</td>
<td>Can be cured with drugs and other therapies</td>
<td>.057</td>
<td>.403</td>
</tr>
<tr>
<td>and control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dear: Date:

My name is Nancy Albert. I am a Registered Nurse from the Cleveland Clinic Foundation working on my Doctorate Degree in Nursing at Kent State University, College of Nursing. I want to do research to learn more about what heart failure means to you. I wish to learn how your beliefs of heart failure affect your feelings and self-efficacy or confidence to carry out low salt diet advice. I want to do this because your beliefs and knowledge about heart failure might shape your desire to follow a low salt diet at home.

Information on the research: I would like you to take part in this project. If you agree to participate, you will be asked to complete 1 questionnaire packet of 6 short surveys. These surveys will give me information about your background, heart failure beliefs, exercise and activity capabilities, beliefs about carrying out a low salt diet, symptoms and feelings and social / financial information. The questionnaire packet of 6 surveys has a total of 75 items and takes about 20-40 minutes to complete.

There are 2 ways to participate: by mail or by telephone call. If you choose by mail, I will mail the questionnaire packet of 6 surveys and provide you with a self-addressed, stamped envelope. Just complete the surveys and mail them back within 2 weeks of receiving them. If you prefer to complete the surveys by telephone call, I (or another research nurse) will call you and ask you the questions by telephone. I will also mail you the survey packet so you can follow along while I ask questions. Either way, once the survey information is collected, your involvement is completed.

I am asking 192 people with a history of heart failure to complete the 6 surveys. You do not need to place your name on any of the surveys in the questionnaire packet. A code number will be used, not your name, to identify you and maintain your confidentiality. The surveys are marked with large numbers in the upper right corner to identify each. I (or another research nurse) will collect data from your medical record about your age, race, gender, marital status, history of being involved in a heart failure research study, history of being evaluated or listed for cardiac transplantation and your other medical conditions and history of heart surgery.

Risks and discomforts: Whenever people participate in research, they must consider the ways they may be harmed and then give their consent. The risks involved in this research are minimal. You may begin to think about heart failure, a low salt diet, or your
feelings and symptoms differently after reading the statements on the surveys, or you may become fatigued from answering survey questions. If you want additional information or have questions about statements on the surveys, you can call me at the phone number listed on page 2. If you choose to complete the surveys by mail format, please know that there is very little writing involved. Just circle a number or letter, place a ‘x’ in the box that expresses your beliefs and feelings, or write out one-word answers. You can complete the packet of surveys in more than one sitting, at your convenience. If you agree to take part, you may stop at any time.

**Benefits:** You will not experience any benefits from this survey research, but the information you provide may influence the way we provide education about heart failure and low salt diet in the future.

**Alternatives:** You can decide not to participate at any time, for any reason, by simply not filling out the surveys.

**Privacy and Confidentiality:** Confidentiality will be maintained to the limits of the law. The Cleveland Clinic must comply with legal requirements that mandate disclosure in unusual situations. Otherwise, the information recorded about you as part of this research will be maintained in a confidential manner. The Cleveland Clinic will not use or disclose the information collected in this study for another purpose without your written permission, unless the Cleveland Clinic Institutional Review Board gives permission after ensuring that appropriate privacy safeguards are in place. The Institutional Review Board is a committee whose job it is to protect the safety and privacy of research subjects.

If you choose not to sign the consent form on page 3, you will not be permitted to participate in this research study.

After you mail the surveys back to me, I will only contact you if your responses on the Nine Symptom Checklist, that addresses your symptoms and feelings, indicate that you are very depressed. I will encourage you to seek medical care and I will inform your primary care Cleveland Clinic doctor that I contacted you.

**Costs:** There is no costs any you will not receive any payments for participating in this survey.

**Questions:** If you want to know more about this research project, please call Nancy Albert, MSN, RN at (216) 444-2200. The operator will page me. Kent State University and The Cleveland Clinic have approved this project. If you have questions about your rights as a research subject, you should contact the Cleveland Clinic Institutional Review Board at 216-444-2924. If you have any questions about Kent State University rules for research, please call my advisor, Dr. Diane Biordi, Professor and Assistant Dean, Research and Graduate Affairs, Kent State University College of Nursing (Telephone: 330-672-8762) or Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Telephone: 330-672-2704).
**Voluntary Participation:** Your participation in this project is completely voluntary. You can choose not to participate, or stop participating at any time without penalty or loss of medical care. By participating, I will learn if beliefs about heart failure lead to thoughts and feelings that affect a person’s diet. This information may improve the health of future heart failure patients.

Please complete page 3. You received 2 copies. Use the copy that is *not* stapled to this letter. Mail it back to me in the pre-stamped pre-addressed envelope. It tells me if you are willing to participate in this survey study. I hope to receive your response within the next 2 weeks. If I do not hear from you, I will phone you. If you agree to take part in this project, I will mail you the questionnaire packet of 6 surveys.

Sincerely,

Nancy M. Albert MSN, RN  
Doctoral Candidate, Kent State University, College of Nursing
Heart Failure Illness Beliefs and Low Sodium (Salt) Diet

**Directions:** Check boxes that apply. Provide your name, address, signature, and then mail back.
- Please MAIL me the survey packet to complete.
- Please TELEPHONE me to complete the 6 surveys. My phone number is:
  
  (______) ______- ___________

  Best time to contact me by telephone during Monday-Friday is:
  - Morning (8am – 11 am)
  - Mid-day (11:30am – 2 pm)
  - Afternoon (2:30 pm –5:30pm)
  - Early evening (6:30 pm – 8pm)

  Here’s my best time(s): ______________________________

  Best day of week to be contacted
  - Monday
  - Tuesday
  - Wednesday
  - Thursday
  - Friday
  - Any weekday is OK

**Signature:** I have read the information on pages 1 and 2 and have all my questions answered to my satisfaction. I understand that my participation is voluntary and that I may stop my participation in this study at any time. Signing this form does not waive any of my legal rights. A copy of this consent is provided to me (stapled to page 1 & 2). By signing below, I agree to take part in this research study.

__________________________   ________________
Subject Signature     Date

____________________________
Subject (Print Name)

- I do not wish to participate.

**Your Name and Address**
Print or place mailing label in the box. Include your zip code.
HEART FAILURE
ILLNESS BELIEFS
and
LOW SODIUM (SALT) DIET

Kent State University

Nancy Albert, RN, MSN, Doctoral Candidate
The Cleveland Clinic Foundation
9500 Euclid Avenue, M-13
Cleveland, Ohio 44195

Phone: 216-444-2200 or 1-800-223-2273;
Ask operator to page me (pager number 24930)

QUESTIONNAIRE PACKET

Contains:
- Cover letter (back side of this cover)
- 6 surveys – each has a large number in the upper right corner

Thank you for taking time to complete these 6 short surveys and returning the pre-addressed stamped envelope.
Thank you for agreeing to participate in this study. The following 6 surveys will help us learn what heart failure means to you and how your beliefs of heart failure affect your feelings and ability to carry out low salt diet advice.

Please answer all of the questions on each survey. You may wish to do this all at one time or work on the surveys in segments. There are a total of 6 short surveys. All together, they will take you about 40 minutes or less to complete. Please return within 2 weeks.

All 6 surveys are stapled to this cover page. Each survey is marked with a large bold number in the right upper corner. Read the instructions for each survey before you start. Be sure to address each statement or question.

If you do not understand something you read, feel free to call the research nurse (telephone number is written below and on the last page of the survey packet).

When done, fold this packet in half and place in the pre-addressed, stamped envelope. Place in the mail and you are done. After you return the surveys, may be contacted by the research nurse if your responses on the Nine Symptom Checklist (survey # 5) indicate that you very depressed. You will be encouraged to seek medical care and your primary care doctor at the Cleveland Clinic will be notified. However, your survey responses will not be shared with anyone.

If you initially chose to mail the completed surveys back to us and have changed your mind and want us to ask you the questions over the phone, call the research nurse and we will set up a telephone interview:

Nancy Albert R.N., M.S.N.
The Cleveland Clinic Foundation
Local: 1-216-444-2200 or Toll free: 1-800-223-2273
Ask operator to page me at pager number 24930.
Thank you again for participating in this study
Appendix M  PREDICTORS OF PERCEIVED DIET SELF-EFFICACY

Telephone Interview Script to Collect Data on 6 Surveys
Note: Written informed consent will already be obtained

Words in italics are for the interviewer only; to clarify content.

Hello Mr./Mrs./Ms ___________________. My name is ___________________________
(Interviewers Name/title; i.e., Ms, Mrs., Mr.).

I am calling from the Cleveland Clinic to obtain data that will help us learn more about how your beliefs of heart failure affect your feelings and confidence to carry out low salt diet advice.

Did you receive the questionnaire packet in the mail that is related to this research study?

Read the privacy notice below:

I would like to ask you questions from the 6 surveys contained in the questionnaire packet. There are 75 questions in total. It will take between 20 and 40 minutes for us to complete the paperwork.

Is it a good time for you to talk to me? Is it OK for me to ask you some questions? ___Yes, __No.

• If the answer is “NO” to one or both questions, find out if the participant (a) changed their mind and chooses to stop participation or (b) does not have time to talk right now.
• If (a): the participant’s questionnaire packet is marked: “Do Not Contact”.
• If (b): find out the best day of week and time of day to call back, give the patient your name again and state:
  I will look forward to speaking to you again on (day) at (time). Have a good day. Good-bye.

• If the answer is “YES”, remind the participant that they can stop before all surveys are completed if they get tired. That you can call them back to finish the work if needed.

Do you have the questionnaire packet in front of you?

• If yes: Go to the page with a large number 1 in the upper right corner. The survey is titled: Medical Background Survey. Read the directions at the top of the survey. Begin asking questions exactly as they are written on each survey. Be sure you understand the patient’s response, by repeating their answer and having them confirm it is correct, as needed. When finished, read the bolded words at the bottom of each survey that moves the participant to the next survey, state the title of the survey, read the directions, then begin asking questions.
  • If no because participant cannot find packet, ask: Can I begin asking questions, even though you cannot follow along? If no: resend packet and negotiate a date and time for next telephone contact.
  • End phone call with same message at bottom of 1st box above.
• If yes: proceed as above with bolded words in the 2nd bullet in this box.
  • End conversation (once all questions are asked) with:
    Thank you for participating in this research study. Do you have any questions or is there anything you would like to discuss before we hang up?

Final statement: Thank you for taking the time to respond to these questions, as your opinions are important to us. Have a good day. Good-bye.

• If the answer is that the patient has died in the very recent past: offer condolences to the family member who answered the phone. Mark the participant’s questionnaire packet: “Do Not Contact”.

5/2004 ma-ccf
TO: James Young, MD, Chairman, Division of Medicine and Medical Director, George M. and Linda H. Kaufman Center of Heart Failure

FROM: Nancy Albert PhD(c), MSN, RN; Principal Investigator

DATE: May 17, 2004

SUBJECT: Endorsement of dissertation work being conducted at the Cleveland Clinic Foundation (on behalf of all medical staff).

Research Title: Predictors of Perceived Diet Self-Efficacy

ABSTRACT: Background: In patients with heart failure (HF), symptoms and healthcare expenditures are often caused by sodium retention from low-sodium diet nonadherence. Perceptions of self-efficacy for a specific behavior influence behavior initiation and persistence over time; however, predictors of perceptions of HF diet self-efficacy have not been studied. To optimize patient education activities and improve diet adherence, the predictors that strengthen perceptions of diet self-efficacy must be sought. Specific Aim: To determine if HF illness threats (medical accuracy of illness beliefs, level of objective cues of HF severity, and depression) predict perceptions of diet self-efficacy while controlling for demographic, social, economic and disease specific variables. Methods: This predictive and inferential study uses a one group, randomized sample (stratified by physician type). After IRB approval and inclusion/exclusion criteria are met, 192 patients will be randomly invited to participate, via mailed letter. Participants will provide written informed consent. Participants will complete four valid and reliable surveys that quantify medical accuracy of HF illness beliefs, functional status, depression and perceptions of low-sodium diet self-efficacy. Objective cues of HF severity, demographic and medical history information will be obtained through completion of 2 surveys and chart/billing system information. Data Analysis: Descriptive statistics will illustrate demographic and medical history characteristics. Correlational analysis, simple linear regression and multiple regression will determine if study variables are predictors of diet self-efficacy and the influence of moderator variables. Potential Significance: This study will provide valuable data that may guide development of a HF education intervention to improve diet adherence. This knowledge might ultimately impact HF morbidity (quality of life and hospitalization) and cost of care.

SAMPLE: Patients will meet the following inclusion criteria: (a) history of chronic systolic, moderate to severe HF, defined as an ejection fraction of 40% or less, (b) hospitalization or ambulatory visit for any reason in the 4 months preceding study initiation, (c) age 18-90, (d) speaks and understands English, and (e) able to give informed consent, read and complete surveys.

Participants will be excluded from enrollment if any of the following criteria apply: (a) cognitive impairment, mental illness or anxiety disorder (history of delirium, psychosis, Alzheimer’s
disease, bipolar disorder or history of depression that precedes onset of cardiac disease by five years or more), (b) uncorrected blindness or hearing loss, (c) no permanent home address or telephone, (d) refuses to give written informed consent, (e) non-resident of the United States, (f) current enrollment in an investigational drug or device research study, (g) renal failure requiring dialysis that interferes with data collection, and (h) new diagnosis of HF after cardiac transplantation.

DATA COLLECTION: The six study tools that patients complete contain a total of 75 items. It is estimated that it will take 40 minutes or less for elderly patients with HF to complete the data collection process. Instructions for each tool are simple. Statements are short and patients do not need to write sentences, only circle choices on a Likert or dichotomous scale. Participants will be told they can complete all surveys at one time, or they can complete them at their convenience in intervals. In addition, they can request a telephone interview to complete the surveys:

- Background Data - 8 items (general medical and HF background)
- Survey of Illness Beliefs in HF - 14 items (medical accuracy of HF illness beliefs/knowledge)
- Specific Activity Scale - 5 items (NYHA functional class)
- Low Sodium (Salt) Eating Behaviors Survey - 29 items (low sodium diet self-efficacy)
- Nine Symptom Checklist (PHQ-9) - 10 items (depression)
- To Help Us Understand You - 9 items (socioeconomic data)

In addition, the PI will collect medical comorbid condition information from the electronic medical record.

HUMAN SUBJECTS PROTECTION: If a participant’s depression scores are in the moderate-severe or severe range (major depression), the PI will:

1. Notify patients of their score, inform that that their primary care provider at The Cleveland Clinic will be notified, and encourage them to seek medical care through their Cleveland Clinic primary care physician,
2. The patient’s Cleveland Clinic primary care physician will be notified that patients were contacted and will be told of the major depression finding via electronic mail, and
3. Nurse-initiated communication will be recorded in the patient’s electronic medical record. During the contact, patients can verbalize thoughts and feelings about HF with the PI, who is a Registered Nurse with 27 years of experience in dealing with patients with HF.

This dissertation will be approved by Kent State University and Cleveland Clinic Foundation IRB’s and also by the PI’s dissertation committee, composed of three PhD RN’s from Kent State University, College of Nursing, one PhD RN from University of Akron, College of Nursing and 1 PhD Educator from Kent State University before implementation will occur.

I am seeking your permission and endorsement to work with heart failure patients who are not currently enrolled in any other research study as part of my research study. Please provide your signature to the endorsement at the bottom of this page, if you agree to this request. If you have questions or need more information, please do not hesitate to contact me at extension # 47028, beeper # 24930, or e-mail at albertn@ccf.org. Thank you.

James B. Young, MD
Date
Appendix O: Institutional Review Board Approval Letters to Begin Research

June 17, 2004

Nancy Albert, M.S.N., R.N./F25

RE: IRB 7279: Predictors of Perceived Diet Self-Efficacy (No Funding)

Dear Ms. Albert:

Thank you for your response dated June 9, 2004, to requests from a prior review of your new study application which was conditionally approved at the June 4, 2004 Institutional Review Board meeting.

This is to confirm that your application including the following documents: the Application dated May 24, 2004, the Clinical Study Protocol (not dated), the revised Informed Consent Document [Appendix H] dated June 9, 2004, the six Questionnaires (Appendix A through F), the Chart Review Form [Appendix G] (not dated), the Telephone Script dated May 2004 and the Letter of Support from the Chairman of the Division of Medicine at Kent State University dated May 17, 2004 have been approved.

A written consent must be obtained from all study participants. Attached are IRB stamp approved consent form, questionnaire packet and telephone script effective for the period June 17, 2004 to June 3, 2005. This consent form must be signed and dated by each subject prior to their participation and a copy must be given to them.

You are granted permission to conduct your study as most recently described effective immediately. The study is subject to continuing review on or before June 3, 2005, unless closed before that date.

Please note that any changes to the study as approved above and any unanticipated problems involving risks to subjects must be promptly reported to the IRB.

Sincerely,

Daniel Beyer, M.S., MHA, CIP
Executive Director
Institutional Review Board

DB:jk
Attachment: Informed Consent Document / Questionnaire Packet / Telephone Script

Expiration Date: June 3, 2005
August 6, 2004

Nancy Albert
11305 Pine Acres Lane
Chesterland, OH 44026

Re: 04-515, “Predictors of Perceived Diet Self-Efficacy”

Dear Ms. Albert:

I am pleased to inform you that this protocol received final approval from the Kent State University Institutional Review Board. The following condition required by the IRB before final approval could be granted has been adequately addressed:

1. To avoid confusion and misperception on the part of subjects the Board requests that you spell out “candidate” after the Ph.D. designation following your name or just use the highest degree you have received.

The following condition was waived on behalf of the IRB by the IRB Chair and will be duly noted at the next IRB meeting:

2. In paragraph 4 sentence 2 of the consent form the sentence beginning, “You do not need to place your name...” should be replaced with “Please do not put your name on any of the surveys...”

It is understood that, in addition to the Kent State University IRB, the Cleveland Clinic Foundation has approved this project and the minor change requested in item #2 would cause unnecessary delays in the research project.

This approval is for one year: August 5, 2004 through August 4, 2005. HHS regulations and Kent State University Institutional Review Board guidelines require that any changes in research methodology, protocol design or principal investigator have the prior approval of the IRB before implementation and continuation of the protocol. The IRB further requests an annual progress report and a final report at the conclusion of the study.

If you have any questions, please contact me at 330.672.2704. (klight@kent.edu)

Sincerely,

Katherine Light
IRB Administrator

cc: Diana Bjordi
    Carol Sedlak

Division of Research and Graduate Studies
(330) 672-2851 • Fax: (330) 672-2658
Graduate Program Services
(330) 672-2660 • Fax (330) 672-2658
P.O. Box 5190 • Kent, Ohio 44242-0001 • http://www.kent.edu
Appendix P

_Bivariate (one-tailed) Correlations Among Study Variables Table_

Low Sodium Diet Self-Efficacy

<table>
<thead>
<tr>
<th>Variables</th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>Age</td>
<td>.17**</td>
<td>.12*</td>
<td>.08</td>
<td>.16**</td>
</tr>
<tr>
<td>Race</td>
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<td>.04</td>
<td>.10</td>
<td>.09</td>
</tr>
<tr>
<td>Gender</td>
<td>.12*</td>
<td>.12</td>
<td>.10</td>
<td>.04</td>
</tr>
<tr>
<td>Marital status</td>
<td>.07</td>
<td>.04</td>
<td>.00</td>
<td>.05</td>
</tr>
<tr>
<td>Someone to confide in</td>
<td>.12*</td>
<td>.15**</td>
<td>.16**</td>
<td>.14*</td>
</tr>
<tr>
<td>Level of education</td>
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<td>.01</td>
<td>.01</td>
<td>.01</td>
</tr>
<tr>
<td>Comfort living on income</td>
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<td>.06</td>
<td>.04</td>
<td>.05</td>
</tr>
<tr>
<td>Medically managed diabetes</td>
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<td>.13*</td>
<td>.11</td>
<td>.14*</td>
</tr>
<tr>
<td>Asthma</td>
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<td>.09</td>
<td>.09</td>
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<td>COPD</td>
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<td>.06</td>
<td>.02</td>
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<td>Atrial fibrillation</td>
<td>.08</td>
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<tr>
<td>Mean illness beliefs score</td>
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<td>.09</td>
<td>.04</td>
<td>.10</td>
</tr>
</tbody>
</table>
Appendix P (continued).

**Bivariate (one-tailed) Correlations Among Study Variables**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Resisting Relapse</th>
<th>Reducing Salt</th>
<th>Behavioral Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives cues- sum of 5</td>
<td>.06</td>
<td>.01</td>
<td>.00</td>
<td>.04</td>
</tr>
<tr>
<td>(1) Type of physician Practice</td>
<td>.07</td>
<td>.05</td>
<td>.06</td>
<td>.08</td>
</tr>
<tr>
<td>(2) Heart transplant evaluation or enlistment</td>
<td>.06</td>
<td>.09</td>
<td>.08</td>
<td>.08</td>
</tr>
<tr>
<td>(3) Research study &lt; 3 mo. Ago</td>
<td>.05</td>
<td>.04</td>
<td>.13*</td>
<td>.07</td>
</tr>
<tr>
<td>(4) Hospital for HF ≤ 1 mo. Ago</td>
<td>.08</td>
<td>.03</td>
<td>.06</td>
<td>.06</td>
</tr>
<tr>
<td>(5) Functional status</td>
<td>.07</td>
<td>.01</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>Depression</td>
<td>.21**</td>
<td>.04</td>
<td>.03</td>
<td>.12*</td>
</tr>
</tbody>
</table>

Note. COPD = chronic obstructive pulmonary disease; mo. = month.

* = $p < 0.05$; ** = $p < 0.01$
Appendix Q

Coefficient for Model (Independent Variables) Predicting Perceived Diet Self-Efficacy

Table

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (Figure 6)</th>
<th>Resisting Relapse (Figure 7)</th>
<th>Reducing Salt (Figure 8)</th>
<th>Behavioral Skills (Figure 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy of illness beliefs</td>
<td>β = -.093 t = -1.36</td>
<td>β = -.088 t = -1.32</td>
<td>β = -.094 t = -1.37</td>
<td>β = -.037 t = -.037</td>
</tr>
<tr>
<td>Objective cues of HF</td>
<td>β = .008 t = .111</td>
<td>β = .011 t = .159</td>
<td>β = .032 t = .453</td>
<td>β = -.015 t = -.015</td>
</tr>
<tr>
<td>Depression</td>
<td>β = -.118 t = 1.68</td>
<td>β = -.204 t = -2.942**</td>
<td>β = -.044 t = -.624</td>
<td>β = .040 t = .570</td>
</tr>
</tbody>
</table>

F for Total Model | 1.705 | 3.781** | .782 | .203 |
R² for Total Model | .023 | .050 | .011 | .003 |


* = p < 0.05; ** = p < 0.01
Appendix R.

*t Values for Depression as a Predictor for Perceived Diet Self Efficacy, Using Control Variables Table*

<table>
<thead>
<tr>
<th>Controls:</th>
<th>Perceived Diet Self Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resisting Relapse</td>
</tr>
<tr>
<td>Age</td>
<td>β = -.18</td>
</tr>
<tr>
<td></td>
<td>t = -2.61**</td>
</tr>
<tr>
<td>Race</td>
<td>β = -.21</td>
</tr>
<tr>
<td></td>
<td>t = -3.22**</td>
</tr>
<tr>
<td>Gender</td>
<td>β = -.20</td>
</tr>
<tr>
<td></td>
<td>t = -3.03**</td>
</tr>
<tr>
<td>Someone to confide in</td>
<td>β = -.18</td>
</tr>
<tr>
<td></td>
<td>t = -2.70**</td>
</tr>
<tr>
<td>Highest education level</td>
<td>β = -.21</td>
</tr>
<tr>
<td></td>
<td>t = -3.10**</td>
</tr>
<tr>
<td>Diabetes, medically managed</td>
<td>β = -.24</td>
</tr>
<tr>
<td></td>
<td>t = -3.63**</td>
</tr>
<tr>
<td>Asthma</td>
<td>β = -.21</td>
</tr>
<tr>
<td></td>
<td>t = -3.12**</td>
</tr>
<tr>
<td>COPD</td>
<td>β = -.21</td>
</tr>
<tr>
<td></td>
<td>t = -3.11**</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>β = -.20</td>
</tr>
<tr>
<td></td>
<td>t = -3.00**</td>
</tr>
</tbody>
</table>

Note. * = p < 0.05; ** = p < 0.01