Self-Care: Influence on Health-Related Quality of Life Among Heart Failure Patients in Oman

By

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Abstract

Background: Heart failure (HF), a clinical syndrome caused by a structural and/or functional cardiac abnormality, is an epidemic. Persons living with HF play a considerable role in managing the syndrome by engaging in HF self-care. Although the past few decades of research have provided significant insight into what HF self-care is and how it can influence outcomes like health-related quality of life (HRQOL), little is known about self-care in many cultures and regions of the world. **Objectives:** The purpose of this dissertation was to understand the relationship between self-care behaviors and HRQOL among adult patients with chronic HF in Oman. The specific aims proposed by this dissertation were to (a) identify patterns of self-care behaviors among adults with HF in Oman and (b) quantify associations between self-care behaviors and HRQOL among patients with chronic HF in Oman. **Methods:** A cross-sectional descriptive research design was used in this dissertation. Data on self-care and HRQOL from 105 patients was collected from an outpatient clinic in the north of Oman. Data were analyzed using latent-class mixture analysis and multivariate regression. Three patterns of self-care were identified. Only one factor (age group) determined membership in patients who demonstrated effective self-care patterns. Significant positive associations were found between HRQOL and each of the self-care behaviors. In addition, HRQOL was associated with self-care patterns. **Conclusion:** Patients with HF in Oman have low self-care behaviors in general and can be classified into subgroups. Health Related Quality of Life was associated with self-care behaviors individually and in patterns. Thus, maximizing self-care may enhance HRQOL in Oman. More work is needed to understand self-care and HRQOL in Oman.

Keywords: heart failure, self-care, health-related quality of life, patterns

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Chapter 1: Introduction

Heart failure (HF) is a clinical syndrome caused by a structural and/or functional cardiac abnormality, resulting in reduced cardiac output and/or elevated intracardiac pressure at rest or during stress (Ponikowski et al., 2016; Yancy et al., 2013). As the common endpoint of many cardiovascular and extra-cardiovascular disorders, HF is burdensome at the personal, clinical, and societal levels. Persons living with HF play a considerable role in managing the syndrome by engaging in HF self-care (Lee et al., 2017; Lee, Tkacs, & Riegel, 2009; Liu, Wang, Huang, Cherng, & Wang, 2014; Riegel, Lee, Dickson, & Medscape, 2011; Seto et al., 2011). Although the past few decades of research have provided significant insight into what HF self-care is and how it can influence outcomes like health-related quality of life (HRQOL), little is known about self-care in many cultures and regions of the world. The purpose of this study is to understand the relationship between self-care behaviors and HRQOL among adult patients with chronic HF in Oman.

Background and Significance

HF is a global epidemic with a prevalence of over 6,500,000 cases in the United States and over 23,000,000 worldwide (Ambrosy et al., 2014; Mozaffarian et al., 2015; Roger, 2013). Several factors account for this increase in the prevalence of HF. The most significant factor is the growing population of older adults, as HF is primarily a geriatric illness (Lloyd-Jones, 2002). Other factors—including improved treatment and survival after myocardial infarction, poorly controlled hypertension (HTN), and diabetes mellitus (DM)—also increase the risk of HF (Ahmad et al., 2016; Kristensen et al., 2016; Nohria et al., 2003; Velagaleti et al., 2008). In the United States, for example, HF is the fastest growing cardiovascular disorder and the leading cause of both hospitalization and rehospitalization among older adults (Desai & Stevenson,

2012; Heidenreich et al., 2013). In other industrialized areas, such as Europe, Australia, and

Canada, the prevalence of HF has similar trends (Ponikowski et al., 2016; Sahle, Owen, Mutowo,

Krum, & Reid, 2016; Schocken et al., 2008; Yeung et al., 2012). Correspondingly, the

prevalence of common antecedents to HF, such as DM and HTN, are dramatically increasing in

countries of the Middle East region, including Oman, the focus of this study. However, specific

knowledge about the epidemiology of HF in these areas is currently lacking (WHO, 2015). The

total population prevalence of HF in Oman is undocumented; however, based on available data

from hospital settings around the country, out of 308,400 total admissions, there were 1,475

cases of HF. This prevalence increases with age, with approximately 3% of the 45–49 age group,

6% of the 55–59 age group, and 34% of the 60-and-older group (MOH, 2013).

Heart Failure considerably affects health outcomes. For example, HF substantially affects

HRQOL and symptom severity (Goldberg, Spencer, Farmer, Meyer, & Pezzella, 2005; Heo et

al., 2014). Often described as the hallmark of patient-reported outcomes, HRQOL in patients

with HF may be reduced by symptoms of breathlessness, limb edema, and fatigue, often

resulting in disturbed sleep, inability to carry on normal daily activities, and declining cognitive

function (Lee, Mudd, et al., 2015; Zambroski, Moser, Bhat, & Ziegler, 2005).

There is evolving evidence that HF self-care can improve outcomes that are patient-

reported, such as HRQOL and symptoms, as well as clinical outcomes, such as hospitalizations

and mortality (Lee, Mudd, et al., 2015; Liu et al., 2014; Riegel, Lee, Dickson, et al., 2011). The

mechanism of association between HF self-care and HRQOL, however, is still unclear due to

inconsistency in the results of studies that have examined this relationship (Riegel et al., 2017).

This field especially lacks knowledge in this regard in countries of the Middle East region, such

as Oman.

The Debilitating Syndrome of Heart Failure

HF is a clinical syndrome characterized by multiple symptom manifestations and various causes. As delineated previously, HF is caused by a structural and/or functional cardiac abnormality. Specifically, cardiac abnormalities lead to ventricular dilatation or hypertrophy, venous congestion, and inadequate oxygen delivery. Disorders that affect the pericardium, myocardium, endocardium, heart valves and great vessels, and certain metabolic abnormalities may result in HF (Ponikowski et al., 2016; Yancy et al., 2013).

Patients with HF may go through four stages of disease progression with varied severity and symptom manifestations at each stage. First, at Stage A, patients are at high risk for HF but lack structural heart disease and symptoms of HF. Second, at Stage B, patients have heart disease but do not show signs or symptoms of HF. Third, at Stage C, patients have structural heart disease with prior or current symptoms of HF. Fourth, at Stage D, patients have refractory HF, requiring specialized interventions (Yancy et al., 2013).

As HF progresses, patients are faced with various symptoms that worsen their HRQOL. Patients may experience symptoms, including breathlessness, ankle swelling, and fatigue, that may coincide with signs such as elevated jugular venous pressure, pulmonary crackles, and peripheral edema (Ponikowski et al., 2016; Yancy et al., 2013). The co-occurring physical and psychological symptoms experienced by patients with HF (Lee, Hiatt, et al., 2015; Moser et al., 2014) are associated with HRQOL (Heidenreich et al., 2013; Heo et al., 2013; Lee, Mudd, et al., 2015; Liu et al., 2014). Furthermore, HF is the result of multiple conditions and occurs with other chronic comorbidities, such as DM, HTN, and other cardiac and non-cardiac-related conditions (Bozkurt et al., 2016; Kristensen et al., 2016; Moser et al., 2014). With these multiple

symptoms, comorbidities, advanced regimens, and device therapies, patients with HF often face the challenging management of their conditions.

Consequences of Heart Failure on Health-Related Quality of Life

As a progressive disease, HF over time cannot be cured. Instead, it can be managed at a level where the patient has periods without symptoms and/or the patient is able to delay the progression of cardiac-muscle destruction (Lee & Auld, 2015). Furthermore, HF becomes debilitating when patients reach a stage where their cardiac muscle is so dysfunctional, they require device use and/or transplantation (Heidenreich et al., 2013). In addition, the overall prognosis of HF is poor and is worse than the prognoses of most cancers (Allen et al., 2012). Survival in HF is directly related to HRQOL (Hoekstra et al., 2013); therefore, maximizing a patient's HRQOL is central to the management of HF.

Patients with HF have worse HRQOL than their counterparts with other chronic conditions and, unsurprisingly, than those who are healthy and of similar age (Zhang et al., 2016). Potential reasons for why patients with HF have such relatively poor HRQOL include the severity of their symptoms and the combination of both physical and psychological symptoms. For instance, physical and psychological symptoms are shown to reduce HRQOL (Heo et al., 2013). In addition, patients who have compromised HRQOL may not accept their HF and become uninvolved in their disease management (e.g., poor self-care behaviors). As a result, their HFs may worsen and HRQOL further decline (Obieglo, Siennicka, Jankowska, & Danel, 2016). Understanding the interplay between HRQOL and self-care is essential to help providers intervene effectively.

Effective Management of Heart Failure

The effective management of HF should include a blended approach of pharmacological and nonpharmacological strategies. From a pharmacological stance, HF management aims to lessen sodium and water retention, improve ventricular function, reduce afterload, reduce cardiac oxygen demand, and delay ventricular remodeling (Borlaug & Paulus, 2011; Ponikowski et al., 2016). The main drug groups that are essential to achieving those aims are angiotensin-converting enzyme inhibitors. In addition, aldosterone receptor antagonists, angiotensin receptor blockers, diuretics, digoxin, and vasodilators are other drugs that can be used to support HF treatment (Desai et al., 2015; Driscoll, Currey, Tonkin, & Krum, 2015; Eisen et al., 2017; Mebazaa et al., 2015; Ponikowski et al., 2016; Valente et al., 2014)

Given the complexity of HF, nonpharmacological management is considered an imperative aspect of HF management. It may include sodium restriction, fluid restriction, exercise, and weight monitoring (Corra et al., 2018; Doukky et al., 2016; Miller & Mullan, 2014; Riegel, Lee, Dickson, et al., 2011) . It may include symptom management and device management as well (Heidenreich et al., 2013). The process by which the patient achieves these strategies is often referred to as HF self-care.

Self-care: An effective approach for the management of heart failure. The self-care of HF is defined as "a naturalistic decision-making process involving the choice of behaviors that maintain physiologic stability (maintenance) and the response to symptoms when they occur (management)" (Riegel & Dickson, 2008, p. 192). To maintain physiological stability, patients need to adhere to treatment and healthy behaviors. Medication adherence, following a salt- and fluid-restricted diet, and exercising are examples of the process of maintenance. Self-care management refers to the action and behaviors the patient engages in when the patient perceives

and interprets his or her symptoms. An example of self-care management is taking an extra diuretic when experiencing fluid congestion.

Self-care is shown to be associated with and may improve HF outcomes (Seto et al., 2011; Sherer, Crane, Abel, & Efird, 2016; Vellone et al., 2017). It may improve patient-reported outcomes, such as HRQOL, as well as reduce symptom severity. Additionally, it influences clinical outcomes by decreasing the risk of hospitalization and mortality (Lee, Mudd, et al., 2015; Sherer et al., 2016; Wang, Lin, Lee, & Wu, 2011). However, the mechanism by which self-care impacts outcomes is not clear. One hypothesis is that self-care delays the progression of HF by influencing its pathogenesis. Self-care reduces the progression of HF by deactivating and obstructing neorohormonal activity and by decreasing the systemic inflammatory response (Lee et al., 2009). The work of Lee et al. (2011) supported this hypothesis; they found that patients who engaged in self-care practices may have less biomarkers of neorohormonal activation and systemic inflammation . However, studies that have investigated the relationship between self-care and outcome have inconsistent results. For example, some studies have found that self-care behaviors improve HRQOL (Lee, Mudd, et al., 2015; Marti et al., 2013), whereas other studies have found that self-care has no association with HRQOL (Liu et al., 2014).

Self-care behaviors vary among patients. To improve self-care, HF programs generally use education to enhance self-care behaviors for all their patients. Standardized patient education alone is insufficient to influence self-care in patients with HF and may be insufficient to influence health-care outcomes given the competing comorbidities present in HF that vary across patients (DeWalt et al., 2012; Dracup et al., 2014). To enhance patients' self-care behaviors, emerging research has shifted toward more tailored interventions based on patients' needs, such as motivational interviewing (Masterson Creber, Patey, Dickson, DeCesaris, & Riegel, 2015;

Paradis, Cossette, Frasure-Smith, Heppell, & Guertin, 2010). Investigating naturally existing

patterns of self-care among patients with HF may help researchers and clinicians greatly in

tailoring interventions (Lee et al., 2014; Lee et al., 2017; Lee, Mudd, et al., 2015; Vellone et al.,

2017). This is best achieved by applying newly emerging analytical techniques, such as latent-

class mixture modeling, versus traditionally used analyses that are based on the average patient,

who may not exist. Accordingly, it is important to further investigate the influence of self-care

on HRQOL in patients with HF by first identifying patterns of self-care and their associations

with HRQOL to enhance our knowledge for future tailored interventions.

Heart Failure in Oman

The prevalence and characteristics of HF in Oman are not fully known. One in five

Omanis die before their 70th birthday, mostly from preventable cardiovascular diseases (CVDs;

WHO, 2015). In 2013, total inpatient morbidity due to CVDs was about 15,671 cases, of which

1,400 (9%) deaths involved an HF diagnosis. Data from 5,005 patients with HF ($M_{age} = 59 \pm 15$

years, 63% were males) who were admitted to 47 hospitals in seven Gulf countries, of which

Oman is one, showed 55% of patients presented with acute, decompensated, chronic HF, while

45% demonstrated new onset of HF (Sulaiman et al., 2015). The same data set revealed that

patients with acute HF who were admitted to hospitals in Oman are 10 years younger than their

Western counterparts (Sulaiman et al., 2015).

Generally, HF self-care is poor worldwide, and Oman is no exception. In a recent

analysis that compares more than 15 countries around the world, self-care behaviors were found

to be poor (Jaarsma et al., 2013). In Oman, behaviors of HF self-care are undocumented.

However, studies on DM—another chronic disorder that requires patients to have an active role

in disease management—have indicated that self-care behaviors are generally poor (Alrahbi,

2014; D'Souza, Karkada, Hanrahan, Venkatesaperumal, & Amirtharaj, 2015). Despite the

previously discussed importance of studying the relationship between self-care and HRQOL,

there are no known studies that have been done in HF self-care or in HRQOL in Oman. In

addition, this field still lacks knowledge on self-care and HRQOL characteristics. Moreover, the

generalizability of the findings of other countries might be limited due to variations in culture,

level of health literacy, and access to health-care resources. The proposed study is essential in

uncovering the status quo of self-care practices and HRQOL among adult patients with HF in

Oman. Clinicians and scientists in Oman and countries with similar cultural contexts can use the

evidence from this study to understand the nature of self-care practices and how they may

influence HRQOL. Factors that influence self-care behaviors may differ by environment,

problem, and person (Riegel, Dickson, & Faulkner, 2016). This work will be guided by the

situational theory of HF self-care, which is detailed in Chapter 2 of this dissertation.

<div align="center">**Purpose and Specific Aims**</div>

The overall purpose of this dissertation was to characterize the influence of self-care

behaviors on HRQOL among adults with chronic HF in Oman. Data were collected from patients

with chronic HF attending a tertiary hospital that receives different cardiovascular cases from all

regions of Oman. A full characterization and description of self-care behaviors and HRQOL was

presented in addition to the actual aim results. To achieve this purpose, the following two

specific aims have been identified: (a) Identify patterns of self-care behaviors among adults with

HF in Oman and (b) quantify the associations between self-care behaviors and HRQOL among

patients with chronic HF in Oman.

2) **Identify Patterns of Self-Care Behaviors Among Adults with Heart Failure in Oman**

I used latent-class analysis to identify common patterns of self-care behaviors that differentiate patient skills in self-care. I also included a description of the characteristics of patients engaged in more favorable self-care behaviors. I propose the following two hypotheses related to this aim:

- **Hypothesis 1.1.** Multiple patterns of self-care behaviors can be identified among patients with chronic HF enrolled in this study.

- **Hypothesis 1.2.** Multiple factors, such as age, gender, and attitude of perceived control, will determine the better self-care patterns.

2) Quantify the Associations Between Self-Care Behaviors and Health-Related Quality of Life Among Patients With Chronic Heart Failure in Oman

- **Hypothesis 2.1**. Better self-care behaviors individually or in patterns will be associated with better HRQOL.

This dissertation is built upon existing scientific contributions regarding HF self-care as well as its determinants and outcomes. Moreover, this dissertation addressed the need to understand the influence of self-care on HRQOL worldwide and in Oman specifically (Riegel et al., 2017). The research findings from this dissertation can help implement more personalized approaches in HF care by identifying which patients will benefit most from optimal elf-care strategies. In addition, it will help researchers and clinicians to better understand self-care, HRQOL, and the interplay between them.

Significance to Nursing Profession

The overall goal of this study was to contribute to the management of the global epidemic of HF by understanding the self-care process. Accordingly, the study includes some unique aspects that make this body of work significant and essential. There is available data to partially

understand HF self-care behaviors from all parts of the world except from the Middle East region. In this dissertation, I examined self-care in relation to HRQOL in patients with HF in Oman, a Middle Eastern country that shares similar cultural and linguistic aspects with countries in the same region. Patients with acute HF who were admitted to hospitals in Oman were 10 years younger than their Western counterparts (Sulaiman et al., 2015). Data from research on HF came mainly from older patients; therefore, understanding the relationship between self-care and HRQOL in a younger population will help determine how HRQOL can be optimized at a younger age. Factors that influence self-care behaviors may differ by environment, situation, and person (Riegel et al., 2016), so learning about self-care and its association with HRQOL in another culture is important to the HF literature. Moreover, existing tools that measure self-care behaviors were translated to the Arabic language to conduct this study. Translated versions of these tools may be used by other researchers from Oman or nearby countries. The work of this dissertation fill these gaps by providing essential and preliminary information on how self-care behaviors influence HRQOL. Understanding this relationship in general will help researchers and clinicians know where to focus their efforts when intervening or educating patients with HF. Specifically, knowledge generated from this study will help scientists and clinicians in Oman and countries with similar cultural contexts in the region to better understand self-care and HRQOL in patients with HF.

Summary

HF is a progressive clinical syndrome that is complicated and heterogeneous in nature. Patients with HF experience different types of symptoms and with varying severity. Understanding how patients manage those symptoms using self-care strategies is essential in enhancing their HRQOL. Based on the knowledge generated from results of this dissertation, I

will conclude with recommendations that may advance practice and research in this area.

Chapter 2: Review of Literature

Purpose

The overall goal of the proposed dissertation is to further the understanding of the association between self-care behaviors and HRQOL in adults with HF in Oman. In this chapter, I will build upon the previous introductory Chapter 1 to present the theoretical frameworks and related conceptualizations that will drive this research; a review of the relevant existing evidence, including what is known regarding HF self-care behaviors and HRQOL; the state of the science regarding self-care behaviors and HRQOL in Oman across illness contexts; and a summary of the gaps in knowledge and the significance of the proposed study in addressing some of those gaps.

Heart Failure Self-Care

As previously mentioned, HF is a global epidemic, with a prevalence of over 6,500,000 cases in the United States and over 23,000,000 cases worldwide (Ambrosy et al., 2014; Benjamin et al., 2017; Mozaffarian et al., 2015; Roger, 2013) and strong evidence that it negatively impacts HRQOL in both developed and developing countries (AbuRuz, Alaloul, Saifan, Masa'deh, & Abusalem, 2015; Goldberg et al., 2005; Heo et al., 2014; Hoekstra et al., 2013; Zambroski et al., 2005). Although the prevalence of HF in Oman is currently unknown, available data from hospitals in Oman suggest that 34% of people 60 years of age and older who were admitted to hospital had HF (MOH, 2013). Because of the direct relationship between HRQOL and survival in HF patients (Hoekstra et al., 2013), it is vital to maximize HRQOL. One important factor linked to better HRQOL and clinical outcomes is the patient's engagement in HF self-care behaviors (Lee, Mudd, et al., 2015; Marti et al., 2013). However, no research has examined such HF self-care behaviors in Oman.

Conceptualizing Self-Care

In the past, the World Health Organization (WHO) provided the following definition of self-care:

> The activities individuals, families and communities undertake with the intention of enhancing health, preventing disease, limiting illness, and restoring health. These activities are derived from knowledge and skills from the pool of both professional and lay experience. They are undertaken by lay people on their own behalf, either separately or in participative collaboration with professionals. (WHO, 1983, p. 2)

However, in 2009, the WHO revised this definition to reflect a more autonomous role for patients, describing self-care as "the ability of individuals, families and communities to promote health, prevent disease, and maintain health and to cope with illness and disability with or without the support of a health-care provider" (WHO, 2009, p. #). This revised focus on the autonomous role of the patient, as well as on both maintaining health and coping with illness, is reflected in many definitions and conceptualizations of self-care across chronic illness contexts, including the HF context specifically—in which maintenance behaviors, symptom perception, and management of symptoms are important aspects of self-care (Riegel et al., 2016; Riegel, Jaarsma, & Stromberg, 2012).

The Situation-Specific Theory of Heart Failure Self-Care

Riegel et al. proposed the situation-specific theory of heart failure self-care in 2008 and revised it in 2016. Closely linked to the broader middle-range theory of self-care of chronic illness (Riegel et al., 2012), the theory of HF self-care defines self-care as "a naturalistic decision-making process that influences actions that maintain physiologic stability, facilitates the perception of symptoms, and directs the management of those symptoms" (Riegel & Dickson,

2008, p. 226). Three central concepts are purported to reflect the two phases of the self-care

process: maintenance and management response to symptoms; Figure 1. The self-care process is

considered a linear process, and the phases of the process are thought to occur primarily in

sequence. Furthermore, self-care confidence is theorized as a moderator and mediator between

self-care maintenance and management.
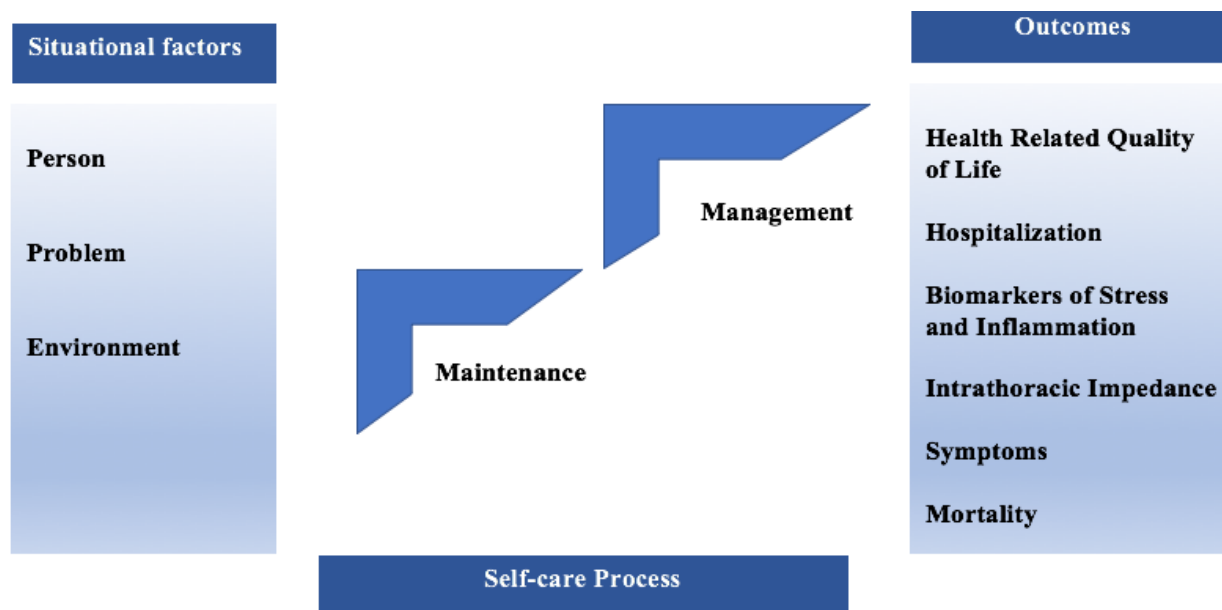
Figure 1. The situation-specific theory of heart failure self-care.

The initial stage of the process is self-care maintenance, which captures treatment

adherence and healthy behaviors (e.g., taking medications, exercising, and following a salt-

restricted diet; Riegel et al., 2016). It is strongly recommended that HF patients engage in both

preventative and treatment-adherent behaviors such as maintaining their vaccinations and dental

health, exercising daily, adhering to their medication regimen, and eating a low-sodium diet

(Riegel, Lee, Dickson, et al., 2011; Riegel et al., 2017). The goal of these maintenance behaviors

is to maintain the physiologic stability of the patient. Self-care management is the response to

symptoms when they occur—for example, taking diuretic medication to reduce fluid congestion

(Riegel et al., 2016).

Decisions to engage in self-care behaviors are thought to be based on an interaction of the situational factors of personal characteristics (e.g., age), problem manifestations (e.g., multiple comorbidities), and environment (e.g., social support; Riegel et al., 2016). Other factors that are proposed to influence decisions about self-care include knowledge (e.g., knowledge about sodium restriction), skills (e.g., reading labels before taking medications), experience (e.g. previous symptom event) and values (e.g., having a normal meal with a family or friend is more important than following a treatment plan of a low-sodium diet). The confidence in one's ability to perform the self-care process is referred to as self-care confidence. Finally, engaging in greater levels of self-care behaviors is theorized to lead to better patient outcomes, including better HRQOL.

In addition, self-care confidence and consultative behaviors were explored to provide a better holistic understanding of the self-care process. We tested the most-important situational factors that influence the decision to engage in the self-care process in this dissertation. Specifically, I examined age, gender, comorbidities, self-care confidence, education, social support, left ventricular ejection fraction (LVEF), and control attitude, as they are the most-important factors that may influence self-care.

What Is Known About HF Self-Care

The vast majority of research on HF self-care has followed three lines of inquiry over the past few decades. First, researchers have examined the potential barriers and facilitators of engagement in HF self-care behaviors. These barriers include comorbidities, cognitive impairment, depression, anxiety, sleep disturbances, and poor health literacy (Currie, Rideout, Lindsay, & Harkness, 2015; Dolansky et al., 2016; Lee, Gelow, et al., 2013). Some of these barriers, such as the inevitable cognitive impairment with age, cannot be prevented, but other

barriers such as depression and anxiety may be modified or treated. Facilitators of better self-care may include motivation, experience and skills, cultural beliefs and values, habits, functional and cognitive abilities, confidence, support, and access to care (Jaarsma, Cameron, Riegel, & Stromberg, 2017). The ongoing study of barriers and facilitators has led to interventions such as the recent introduction of motivational interviewing and family engagement, that have focused on improving self-care (Chung, Lennie, Mudd-Martin, & Moser, 2015; Masterson Creber et al., 2015; Paradis et al., 2010).

Second, researchers have focused on the association between self-care behaviors and HF symptoms (Auld, Mudd, Gelow, Hiatt, & Lee, 2017; Jurgens, Lee, & Riegel, 2015; Lee et al., 2011; Reeder, Ercole, Peek, & Smith, 2015; Wakefield, Groves, Drwal, Scherubel, & Kaboli, 2016). Third, researchers have examined the influence of self-care behaviors on HF outcomes such as HRQOL, hospital admission, and mortality (Dracup et al., 2014; Koberich, Lohrmann, Mittag, & Dassen, 2015; Lee, Mudd, et al., 2015; Liu et al., 2014; Seto et al., 2011; Wakefield et al., 2016; Wang et al., 2011).

More studies investigating self-care barriers and facilitators, the relationship between symptoms and self-care, the influence of self-care on health outcomes such as hospital admission and HRQOL in various populations are still needed, as the above studies presented were mainly done on Caucasian samples in developed countries. In general, I am not aware of any such lines of inquiry in developing countries such as Oman. A program of research that entails the previous three lines of inquiries is needed. In this dissertation, I aim to fill some of these gaps by first examining the influence of self-care on HRQOL, as it is the hallmark of patient-reported outcomes.

Recent emerging evidence suggests that engagement in HF self-care behaviors varies across patients with three distinct phenotypes that are identified as novice, inconsistent, and expert typologies. Dickson, Deatrick, and Riegel (2008) were the first to qualitatively describe the identification of those typologies in self-care management as novice, expert, or inconsistent (n = 41; Riegel, Lee, Albert, et al., 2011). Riegel, Lee, Albert, et al. (2011) then quantitatively confirmed those typologies on a sample of 689 adults with HF. However, those typologies were identified based on a cluster analysis, which emphasizes an average patient that may not exist. In support of the notion of identifying patients' self-care typologies, Lee et al. (2015) found the same typology labels using a more-comprehensive advanced statistical method (latent-class analysis) to identify distinct patterns and reveal latent profiles among symptom-response behaviors (self-care management and consultative behaviors) (Lee, Mudd, et al., 2015).

Patients who are novice in self-care have higher functional status, poorer attitudes, and lower confidence, and they report more daytime sleepiness and depression than those who are inconsistent or experts in self-care. Patients who are inconsistent in self-care lack attentiveness to new changes in status, have cognitive decline, and lack family engagement relative to those who are novice or experts in self-care (Riegel, Lee, Dickson, et al., 2011). On the other hand, experts in self-care are experienced and skilled and have positive attitudes but may be functionally compromised compared with novice and inconsistent patients (Riegel, Lee, Dickson, et al., 2011).

Lee, Gelow, et al. (2015) identified two distinct classes (novice and expert) of consulting behaviors and three distinct classes (novice, inconsistent, and expert) of self-care symptom-management behaviors. This study was the first in which researchers identified unique patterns of self-care in HF patients. In addition, in seminal longitudinal work by Lee, Mudd et al. (2015),

two trajectories of self-care management were identified that had unique associations with

HRQOL (Lee, Mudd, et al., 2015). The first trajectory was of patients who had a decline in self-

care management and had no significant change in HRQOL. The second trajectory, was of

patients who had improvements in self-care management and had improvements in HRQOL at

the same time (Lee, Mudd, et al., 2015). These two studies have provided new insights and open

the field for an alternative approach to study naturally occurring profiles of self-care in HF. This

dissertation draw on the seminal work of Lee, Gelow et al. (2015) in terms of identifying distinct

patient's profiles of self-care behaviors in Oman.

The Theory of Heart Failure Self-Care as a Guiding Framework for the Study of Self-Care

in Oman

Due to the lack of evidence that exists regarding HF self-care behaviors in Oman, I will

begin this important research by focusing on the role of HF self-care behaviors in HRQOL to

advance the science in both self-care, HRQOL, and the relationship between self-care and

HRQOL. Guided by the theory of HF self-care, we will examine self-care maintenance and self-

care management behaviors and control for important personal (e.g., examine confidence in self-

care and control for attitude), problem (e.g., lack of physical activity) and environmental (e.g.,

social support) factors.

We drew upon the seminal work of Jaarsma, Arestedt, Martensson, Dracup, and

Stromberg (2009), who have drawn attention to the fact that self-care reflects not only an

autonomous aspect of the patient's decision to initiate self-care but also a consultative aspect,

which involves family caregivers' and providers' contributions to the patient's decision to

engage in self-care. Jaarsma et al. (2009) found that patients who are better at consulting with

providers in response to signs and symptoms of congestion are also better at recognizing and

engaging in self-initiated strategies (Lee, Lyons, et al., 2013). In addition, patients who know when to consult their health-care providers do not necessarily master self-management of symptoms and vice versa (Lee, Gelow, et al., 2015). Thus, we investigated self-care consultative behaviors to complement my study of self-care management behaviors in Oman.

Relationship between Heart Failure Self-Care and Health Related Quality of Life

State of the Science in Developed Countries

Most of the extant literature on the association between HF self-care and HRQOL has been generated in developed countries—mostly in the United States and Europe, where life expectancy for HF patients is higher and HF management programs are more established within the health-care systems. Although HF self-care has been shown to be associated with better patient outcomes (Dracup et al., 2014; Koberich et al., 2015; Lee, Mudd, et al., 2015; Liu et al., 2014; Seto et al., 2011; Wakefield et al., 2016; Wang et al., 2011), the evidence shows inconsistent findings regarding HF self-care's role in HRQOL. This may be due to issues related to design (blending other interventions with self-care), analysis (calculating an index for an average patient that may not be present), measurement (using generic measures versus specific measures), and concept (mixing the conceptualization of HF-related quality of life with general health and general quality of life). For example, studies in this field can be categorized into studies that have found either a positive relationship, a negative relationship, or no relationship.

Self-Care and Its Positive Association With HRQOL

As postulated in the theory of HF self-care, several quantitative (longitudinal and cross-sectional) studies have found that better HF self-care is related to better HRQOL (Lee, Mudd, et al., 2015; Marti et al., 2013; Seto et al., 2011). Similarly, the few prospective longitudinal observational studies designed primarily to test the relationship between self-care and HRQOL

(Lee, Mudd, et al., 2015) have found that patients who over time engage in greater levels of HF self-care experience more improvements in their HRQOL compared to those patients who engaged less in HF self-care behaviors over time.

Similarly, some multidimensional interventional studies (self-care blended with other interventions such as nurse contacts via phone) have also found a positive association. For example, Musekamp et al. (2017) found an improvement in self-care and an associated improvement in HRQOL. However, in this study, a generic versus HF-related self-care instrument was used, which may have not been sensitive to changes in HF self-care over time. Instead it was sensitive to general self-care. Also, among the few interventional studies that have focused solely on HF self-care without blending it with other interventions, some reported a positive association with HRQOL as well (Hoban, Fedor, Reeder, & Chernick, 2013).

Self-Care is not Associated with HRQOL

On the other hand, some other cross-sectional studies have also found no significant association between HF self-care and HRQOL (Buck et al., 2012; Nesbitt et al., 2014) . The study by Nesbitt et al. (2014) was unique because it was done on patients from multicenter rural areas, most of the patients were on treatment (diuretics, beta blockers, and ACE inhibitors), and had an ejection fraction (EF) greater than 50, which may have contributed to giving the patients enough physiologic stability that they did not need to initiate self-care (Nesbitt et al., 2014). In the study by Buck et al. (2012), low Cronbach's alphas for the maintenance and management scales (.61 and .63, respectively) may have contributed to the nonsignificant results between self-care behaviors and HRQOL.

Some interventional studies found no change in HRQOL after a self-care intervention (Jaarsma et al., 2008). However, in the study by Jaarsma et al. (2008), self-care was not

measured, which obscured my ability to conclude an association or a change in self-care as an outcome of the intervention. Jaarsma et al. (2008) followed HF patients for 18 months (making theirs the longest of such interventions—previous interventions were 12 months or less in duration). They recruited patients ($n = 1,023$) from clinics and hospitals. The intervention consisted of several approaches to enhancing HF self-care (individual sessions with a cardiologist, 18 nurse visits, two home visits, two multidisciplinary sessions, and follow-up telephone calls with nurses); the control group received the usual care only (Jaarsma et al., 2008). However, despite the strengths of this intervention, due to the multicomponent nature of the intervention, the influence of HF self-care is confounded with other elements that could impact HRQOL. It was not possible to test self-care's association with HRQOL, as self-care was not measured.

Among the few interventional studies that have focused solely on HF self-care and its influence on patient outcomes such as HRQOL, no association with HRQOL was found (Koberich et al., 2015). The study by Dickson et al. (2014) was a randomized control trial with a pretest and posttest of both self-care and HRQOL conducted in a sample of 75 patients. Dickson et al. (2014) recruited the patients from community centers (patients were 53% female; 32% Hispanic, 27% African Americans). The authors found no effect of the self-care intervention on three-month HRQOL, although self-care improved over time (Dickson et al., 2014). Despite the short duration of the follow-up in this study relative to that in other interventional studies, possible reasons why no effect was found may be that the sample was from a clinically stable, community-dwelling population rather than a hospital-based (i.e., after an event) population or a population of patients already admitted in an HF management program.

Self-Care Has a Negative Association with HRQOL

Beyond the above discussed studies, researchers in one study found a negative relationship: Patients with better HRQOL had poorer HF self-care (Peters-Klimm et al., 2012). However, it is worth noting that the researchers in this study recruited patients who had stable systolic chronic HF from outpatient settings, and thus it is likely that these patients had adequate HRQOL and did not see the need to initiate self-care.

An Inconclusive Relationship

As described above, the literature on the relationship between self-care and HRQOL is inconsistent. One potential reason for the inconsistencies across both observational and interventional studies may be the underlying heterogeneity among HF patients in how they engage in HF self-care. It is not possible to examine this heterogeneity with the traditional statistical approaches that were used in the above described studies, particularly those that focus on the group mean. In other words, the associations between HF self-care and HRQOL as well as the interventional effects of HF self-care programs may be obscured when researchers focus on average effects. Statistical approaches, such as a latent-class analysis, that uncover heterogeneity in engagement in HF self-care and allow researchers to classify patient subgroups by person, problem, and environmental factors are needed (Riegel et al., 2016). The classification and profiling of HF patients' self-care have been found to be effective in increasing the understanding of ways to better administer effective interventions (Lee, Mudd, et al., 2015). As explained previously, the identification of patients' patterns, profiles, and trajectories—including certain patient's characteristics—will help clinicians and researchers in identifying patients at risk and making interventions more tailored to specific patients' needs.

In support of the previous view, Jonkman et al. (2016) completed a meta-analysis of 20 trials of HF self-management interventions. Overall, self-management interventions showed little

improvement in HF-related quality of life in a 12-month period (Jonkman et al., 2016). It may be

that HF self-care interventions are not tailored to specific patients' needs but rather are targeted

to an average patient that may not exist (Lee et al., 2014; Lee, Gelow, et al., 2015; Lee, Mudd, et

al., 2015). Examining how patients vary in their engagement in HF self-care and identifying

characteristics of subgroups of patients are crucial to both understanding the influence of HF

self-care on HQROL and better designing and tailoring HF treatment strategies.

State of the Science in Developing Countries

Similarly, results from studies in which researchers examined the influence of HF self-

care on HRQOL in developing countries are inconsistent. In a cross-sectional study in Taiwan,

Liu et al. (2014) found that HF self-care was not associated with HRQOL. In Iran, researchers in

two interventional studies tested the effect of an educational HF self-care intervention and found

that HRQOL improved in the intervention groups compared to the control groups (Lakdizaji,

Hassankhni, Mohajjel Agdam, Khajegodary, & Salehi, 2013; Mehralian, Salehi, Moghaddasi,

Amiri, & Rafiei, 2014). However, neither of these studies measured HF self-care or examined

the relationship between self-care and HRQOL, which greatly limited the studies' contribution to

this topic. I did not find any other quantitative or qualitative studies investigating this

relationship in developing countries.

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Self-Care in Oman

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As HF self-care in Oman has not been studied before, most of the knowledge on self-care

comes from studies related to other chronic conditions, specifically DM and HTN. Generally, in

the context of DM and HTN, self-care has been found to be poor in Oman (Alrahbi, 2014;

D'Souza et al., 2017). In studies in both disease contexts, researchers focused mainly on self-care

maintenance behaviors such as adherence to medication as well as dietary and exercise

recommendations instead of focusing on other important aspects of self-care such as self-care

management, confidence, and consultative behaviors.

Self-Care Maintenance in Chronic Conditions

Adherence to treatment is an integral part of self-care maintenance (Riegel et al., 2016);

however, beliefs related to medications may influence patients with chronic diseases in Oman.

For example, researchers in a pilot study that had a small sample size ($n = 50$) and tested HTN

patients' adherence to antihypertensive medications found that those who hold a belief that

medication is necessary to their health were more likely to adhere to their medication regimens

(Al-Noumani et al., 2017). In another study, inadequate knowledge and incorrect beliefs about

HTN were reported (Jose, Jimmy, Al-Mamari, Al-Hadrami, & Al-Zadjali, 2015); 60% of

patients with HTN reported a belief that over-the-counter and traditional medications had no

adverse effect on their health (Jose et al., 2015). The belief that those types of medication are

safe and do not carry any hazard to health may obscure a patient's ability to evaluate and monitor

signs of adverse effects. In addition, 58% of HTN patients reported a belief that their primary

health-care provider is responsible for any side-effects that prescribed medicines may cause (Jose

et al., 2015). These findings draw attention to the fact that extent patients in Oman may be

willing to assume an active role in self-care, take responsibility for their actions, and engage in

decision-making regarding their health.

In other disease contexts, similar observations were made. For example, DM patients

were found to adequately follow their prescribed dietary recommendations (Al-Sinani, Min,

Ghebremeskel, & Qazaq, 2010) as well as their medication regimens in terms of dose, frequency,

and administration (Jimmy, Jose, Al-Hinai, Wadair, & H., 2014). However, they reported non-

adherence to regular exercise (a very important aspect of self-care; Al Bimani, Khan, & David,

2015; Alrahbi, 2014). Furthermore, in another study, participants with DM ($n = 563$) had poor

knowledge of risk factors, prevention, and practices (Al Shafaee et al., 2008).

Of note, researchers who examined 8,176 patients admitted to hospitals with a chief

complaint of acute coronary syndrome from the six gulf region countries, including Oman, found

that patients who had HF as a coexisting condition were found to be noncompliant to their

medication regimens (Al-Zakwani et al., 2011), raising the concern that HF patients may be

particularly at risk for non-adherence to medication regimens. Other important self-care

maintenance recommendations such as salt reduction, fluid restriction, smoking cessation, and

elimination of alcohol were not reported. Additionally, none of the above studies reported

information relating to management behaviors or the patients' confidence in their ability to

practice these behaviors, which is clearly a gap in this area.

Self-Care Management, Confidence, and Consultative Behaviors in Chronic Conditions

Although important to the process of self-care, we lack knowledge regarding self-care

management, confidence, and consultative behaviors in Oman, despite their importance in the

process of self-care. In an assessment of patients' behaviors in terms of drug safety among 618

adults with HTN in Oman, patients reported consulting about additional information regarding

medication safety from various sources, with physicians as a main source of information (Jose et

al., 2015). For example, 72% of the patients reported that they consult their physicians when

using traditional medicines, and 78% of the patients reported doing so prior to taking a new

medication (Jose et al., 2015). However, the association between medication adherence and these

consultative behaviors was not tested. We are lacking in my understanding of consultative

behaviors, a very important aspect of self-care, and I do not know whether these behaviors can

influence self-care maintenance, management, or patient-reported outcomes such as HRQOL in

all disease conditions, generally, and in patients with HF, specifically. Similarly, when

conducting this review, I did not find any studies in which researchers investigated self-care

management and confidence behaviors in any disease condition; thus, my understanding of self-

care management and confidence behaviors is also limited.

Barriers, Facilitators, and Determinants to/of Self-Care

Limited literature was found to understanding of the barriers to self-care and facilitators

of self-care in Oman. In a qualitative study conducted by Nadia et al. (2011), health-care

professionals perceived that diabetic self-care was inadequate in patients with DM. Factors

related to health-care providers included workload, language barriers, and a lack of a teamwork

approach. Factors directly related to patients included poor management, nonadherence to

glycemic control, and the influence of culture on their attitudes toward the illness (Noor

Abdulhadi, Al-Shafaee, Wahlstr, & Hjelm, 2011).

At the patient level, the level of education, household income, and presence of a family

history of diabetes were found to be significant predictors of knowledge regarding risk factors,

complications, and the prevention of diabetes (Alrahbi, 2014; Al Shafaee et al., 2008). Diabetic

self-care was also found to be associated with younger age, gender (male participants were better

in following their exercise recommendations whereas female participants were better in

following their medication regimens), higher levels of education, employment, and histories of

DM of more than five years (Alrahbi, 2014; D'Souza et al., 2015). Interestingly, in another

study, a personal history of DM was not found to be associated with medication adherence

(Jimmy et al., 2014).

Organizational factors that hinder optimum DM self-care are thought to be related to

health-care systems, financial resources, lack of professional human resources, inadequate

laboratory support, and availability of medications (Alyaarubi, 2011). Noor Abdulhadi et al. (2011) identified several factors related to providers and patients.

In sum, although DM and HTN are chronic comorbid conditions that may co-occur with HF, I am unable to generalize results from studies that investigated DM and HTN self-care in Oman. My ability to make such a generalization is limited because of differences in symptoms, medication regimen, and the overall self-care tasks required. Although I briefly discussed factors related to organizations and health-care providers that may influence self-care practices in Oman, my focus in this dissertation is on patient-centered variables only (i.e., personal, situational, and environmental factors). We are still lacking the understanding of self-care phenotypes and profiles of patients in Oman and how they face the theorized person, problem, and environment factors that may influence self-care decisions. Further, we have limited knowledge on how patients with chronic conditions in Oman maintain their health. More importantly, we totally lack the knowledge of self-care management, confidence and consultative behaviors in HF and in other chronic disease contexts. The lack of knowledge in this regard, contribute to our limited understanding of how self-care may influence outcomes like HRQOL in Oman among HF patients and patients with chronic conditions.

Health Related Quality of Life in Oman

Health related quality of life in Oman is generally not well studied and, particularly, in HF patients, is unknown. As in the case of self-care, the little knowledge we obtained on HRQOL comes mainly from DM and HTN. Due to shifting the focus from communicable diseases in the past two decades in Oman to controlling non-communicable diseases (Alshishtawy, 2010), DM and HTN - , the two most prevalent conditions, became the focus of research funding and research in Oman.

Comorbidities May Influence Health-Related Quality of Life in Oman

Patients with multiple coexisting chronic conditions may have lower HRQOL. In a

multicenter study in Oman, patients with DM and HTN (n = 450) were surveyed for general

quality of life (QOL; Al-Mandhari, Al-Zakwani, Al-Hasni, & Al-Sumri, 2011). Patients who

have DM and HTN as a comorbid condition had lower scores of physical QOL compared to

those with diabetes alone or HTN alone (Al-Mandhari et al., 2011). In regard to mental QOL, no

significant differences were observed between those who had a combination of DM and HTN

and those who had only one of the two conditions (Al-Mandhari et al., 2011). Apparently,

patients with multiple coexisting chronic conditions may have lower QOL, which may

complicate their self-care practices.

Health-Related Quality of Life and Self-Care

The influence of self-care on HRQOL in non-HF illnesses in Oman is unclear. Patients

with DM had better HRQOL when their glycemic control was adequate, they had a less-than-5-

year history of the disease, and they were less than 40 years old (Al-Maskari, Al-Shookri, Al-

Adawi, & Lin, 2011; D'Souza, Venkatesaperumal, Ruppert, Karkada, & Jacob, 2016). D'Souza

et al. (2016) found gender variations in self-care in DM that may have affected HRQOL. Women

with DM have been found to have better HRQOL than men with DM have (D'Souza et al.,

2016). Melba et al. (2016) reported that determinants of better HRQOL in women included

factors such as greater engagement in self-care. D'Souza et al. (2016) reported that other factors

that could enhance HRQOL include higher levels of education, increased ability to manage

diabetes, an increase in age, moderate ability to assume activities of daily living, higher

knowledge of diabetes, and adherence to medications. However, they provided no details of

whether these factors were associated with greater or less engagement in self-care. Moreover, in

adjusted models controlling for these factors (D'Souza et al., 2016), self-care was not a

significant predictor of better HRQOL. Specific self-care behaviors (i.e., maintenance,

management, consultation) were not discussed. Thus, knowledge of HRQOL and the way in

which self-care influences it in Oman is scarce in general and nonexistent for HF patients in

particular.

Summary

The overall goal of this dissertation is to further the understanding of self-care, HRQOL,

and the association between self-care behaviors and HRQOL in adults with HF in Oman. The

three hypotheses that was proposed by this work are as follows. First, multiple patterns of self-

care behaviors can be identified among the chronic HF patients enrolled in this study. Second,

multiple factors—such as age, gender, and self-care confidence—will determine the better self-

care patterns, and third, better self-care behaviors individually or in patterns will be associated

with better HRQOL. In this chapter, an appraisal of existing literature on self-care conceptual

and theoretical background, self-care and HRQOL in Oman, and influence of self-care on

HRQOL in HF globally were discussed. In summary, inconsistency in results exist HF self-

care's association with HRQOL is inconclusive because of methodological shortcomings in the

studies that tested this relationship. Globally, an understanding of the type and patient

characteristics of self-care in patterns is needed to improve HRQOL. Gaps identified included 1)

a need for understanding of subgroups and patterns of HF patients to help in designing tailored

interventions of self-care and more importantly, (b) self-care, HRQOL, and the relationship

between the two is unknown in Oman as well as in developing countries. In this dissertation, we

aimed to fill these gaps by describing self-care, HRQOL and the association between them in

Oman and by using latent class analysis to identify patterns of self-care.

Knowledge generated from this dissertation will help in understanding HF patients in terms of the influence of self-care on HRQOL in Oman, other Middle Eastern countries, and other developing countries. Drawing on the seminal work by Lee, Gelow et al. (2015) in which they extensively study profiles of self-care in HF, we described patterns and characteristics of self-care among patients in Oman. This may help the broader HF community to better understand ways to tailor strategies and interventions to the individual patient.

Chapter 3: Design and Methods

Purpose

This dissertation proposes two aims: (a) to identify patterns of self-care behaviors among adults with HF in Oman and (b) to quantify the associations between self-care behaviors and HRQOL. In this chapter, the design and method for achieving these aims are presented.

Design

The goal of this dissertation was to characterize the influence of self-care behaviors on HRQOL among adults with chronic HF in Oman; thus, a cross-sectional descriptive research design was used. Data were collected at one point in time for each participant.

Methods

Setting

Ethical approval for this study was obtained from the College of Nursing, Sultan Qaboos University, Oman, and the Institutional Review Board at Oregon Health and Science University. Data were collected from patients attending outpatient clinics of the Sultan Qaboos University Hospital, an academic tertiary-care institution in northern Oman that receives patients from all over the country.

Sample and Sampling Plan

The target population in this study was adult patients with HF. Adults aged 18 years and older with a diagnosis of HF were included in this study. The sample included participants of different demographics including gender, age, employment, socioeconomic status, and educational level. A convenience-sampling method was used. Patients were recruited from outpatient clinics using flyers and recommendations of health-care providers (e.g., physicians, nurse managers). We collected data from 105 individuals. Most of the participants that we

approached agreed to participate in the study.

Inclusion Exclusion Criteria

Adults who were 18 years and older with a HF diagnosis and were cognitively intact were included in this study. We insured that participants could self-report on their experience and English or Arabic. Patients with a cognitive impairment, major psychiatric disorder, or concurrent terminal illness were excluded, as this study required patients to be fully aware and oriented.

Data Collection

Participants interested in the study were initially screened by the investigator for language, ability to self-report their self-care experiences, and any mental disorders. The investigator used documented information in their charts and conducted interviews to explain the purpose of the study. After the initial screening, if the participant met the inclusion criteria, an interview was scheduled on the same day or some other day based on the patient's preferences. In addition, participants who were recruited from the outpatient clinics were given the choice to have the interview in the same day. Prior to data collection, written informed consent was obtained from each participant. During the informed-consent process, the investigator requested permission to contact the participants for any follow-ups. Participants were given the choice to complete the questionnaire by themselves or have the investigator administer the questions by reading them to the patient. Data were collected by registered nurses who had been trained on research conduct by the study's investigator. It took approximately 20 to 30 min to complete the questionnaire.

Measures

A questionnaire was distributed to participants in this study (see Appendix A). The questionnaire included a set of demographic information designed by the investigator, the Self-Care of Heart Failure Index (SCHFI v-6.2), the European Heart Failure Self-Care Behavior Scale (EHFScBS-9), the Control Attitude Scale-Revised (CAS-R), and the European quality-of-life-five-dimensions (EQ5D) measure (Brooks & Group, 1996; Jaarsma et al., 2009; Moser et al., 2009; Riegel, Lee, Dickson, & Carlson, 2009).

Translation process. The investigator translated the SCHFI v-6.2, CAS-R, and EHFScBS-9 into Arabic, which is the official language in Oman. An expert panel consisting of two PhD-prepared cardiovascular nurses performed the assessment. A professional specialist translated the tools used in this study to the English language. Internal consistency was assessed prior to the data analysis. The Arabic version of the European Quality of Life 5 Dimension (EQ5D) measure was adapted from the European Quality of Life Association.

Sociodemographic information. Sociodemographic information was assessed using a standard sociodemographic questionnaire used by many HF self-care and QOL researchers. The questionnaire gathered information regarding gender, age, marital status, education, employment, and financial adequacy. Additionally, it asked about quality of support, smoking history, alcohol use, and physical activity.

Comorbidities and clinical characteristics. Comorbidities and clinical characteristics were assessed using the Charlson comorbidity index through chart abstraction (Charlson, Pompei, Ales, & MacKenzie, 1987) . The index consisted of a list of 17 comorbid conditions, with possible scores ranging from 0 to 30. These scores indicated whether a patient was at a higher risk of mortality. Because the participants in this sample were diagnosed with HF, they

had a score of at least 1. In addition, we obtained other data related to HF from patients' charts

etiology, EF, age, and HF type, if indicated in the chart.

Self-care behaviors. First*,* SCHFI v-6.2 was used to measure patient's behaviors related

to self-care. It is a multidimensional 22-item questionnaire, rated on a 4-point Likert-type scale

with anchors ranging from *never* to *always*. The SCHFI v-6.2 measured self-care maintenance

(treatment adherence and self-monitoring), self-care management (decision-making in response

to symptoms), and self-care confidence (self-efficacy in the ability to perform self-care).

Maintenance and management scores were standardized to range from 0 to 100; higher scores

reflected better self-care. Construct validity was supported with a satisfactory model fit on

confirmatory factor analysis, with comparative fit index of .73 and nonnormed index of .69

(Barbaranelli, Lee, Vellone, & Riegel, 2014; Riegel et al., 2004; Riegel et al., 2009). The

Cronbach's alpha scores for internal consistency measured in this study for the Arabic version

were low in general—.62 for the maintenance behaviors, .48 for the management scale, and .73

for the confidence scale.

Second, the EHFScBS-9 was used to measure adherence to self-care maintenance and

consulting behaviors. Consisting of 12 items, responses for each item range from 1, *I completely*

agree, to 5, *I don't agree at all*, on a 5-point Likert-type scale. The total score, which could range

from 12 to 60, was obtained by adding all the answers. Lower values were indicative of better

self-care. The reported reliability of the original EHFScBS-9 was acceptable, α = .77). Validity

was also established (Jaarsma et al., 2009). Over the SCHFI v-6.2, the EHFScB-9 has the added

benefits of a "consulting behavior" subscale (Cronbach's α = .85) and better overall internal

consistency (Cronbach's α = .80). A drawback of using the EHFScB-9 alone is that it only

measures self-care maintenance and not behaviors related to the response to symptoms. The

Cronbach's alpha score for internal consistency for the Arabic version was .74.

Control attitude. Attitudes of perceived control were measured via the CAS-R**.** The

CAS-R assessed cardiac patients' perceived control in relation to managing their heart condition.

It has eight items, each of which is measured on a 5-point Likert scale ranging from 1 (*strongly*

disagree) to 5 (*strongly agree*). The original CAS-R in HF demonstrated internal consistency

through a Cronbach's alpha score of .76, and it showed good construct validity (Moser et al.,

2009). The alpha score for internal consistency measured in this study for the Arabic version was

.75.

Health-related quality of life. The EQ5D-3L measure was used to measure HRQOL by

asking respondents to rate their current health state with respect to five items: (a) mobility, (b)

self-care, (c) usual activities, (d) pain/discomfort, and (e) anxiety/depression. The EQ-5D-3L

categorized these into five levels: (a) no problems, (b) slight problems, (c) moderate problems,

(d) severe problems, and (e) unable/extreme problems. A higher total score indicated better

HRQOL. It also included a visual analogue scale on which respondents could rate their general

health state ranging from 0 to 100 (Brooks & Group, 1996) .Validity and reliability to be used in

an Arabic-speaking population was established (Aburuz, Bulatova, Twalbeh, & Gazawi, 2009).

The tool was developed to basically describe and value HRQOL and to capture the physical,

mental, and social functioning of HRQOL cumulatively.

Valuation Method

There is no available value set of the EQ 5D-3L for people in Oman nor in nearby

countries of similar cultural contexts. Therefore, for this study, patients' health states of the

sample from Oman was valuated and calculated as a total HRQOL index using the value sets of

the United States, Malaysia, and Zimbabwe, as recommended and provided by the EQ

organization. Specifically, documents containing the scoring algorithms, information on the valuation studies, tables of values for all 243 health states, and SPSS files were requested from the EQ organization.

To compute the index values for the Omani sample with the American TTO, Malaysian, and Zimbabwean value sets, two main steps using a different value set each time. First, the interaction terms were determined using the weights of each country. Second, the index value was computed by adding the weighted responses. The HRQOL index, valuated by each of the three countries, correlated with each other. Because Zimbabwe is the nearest country to Oman in terms of geographic, economic, cultural, and demographic characteristics, the index values valuated by the Zimbabwe value set were chosen for this study. However, it worth noting here that similar to other HF studies, we found that this tool was not sensitive and specific to HF patients in this sample; therefore, the results from the analysis using the analogue scale (EQ VAS) were reported by this dissertation.

The second part of the EQ VAS reported participants' self-rated health state on a vertical, visual analogue scale, where the endpoints ranged from 0 as *best imaginable health state* to 100 as *worst imaginable health state*. This was reported as indicated by the respondents on this scale.

Analysis

Exploratory data analysis. Data were explored for accuracy, missing data, and distribution properties. In addition, data were tested for normality of response, homogeneity of variance, and any possible outliers. No concerns regarding normality or outliers were identified.

Descriptive statistics. Descriptive statistics, including means, standard deviations, and proportions, were used to describe key patient- and clinical-level characteristics in patients with HF. Sociodemographic and clinical statistics were reported to describe the sample.

Internal consistency. Before starting the analysis, the internal consistency of the SCHFI

v-6.2 subscales, CAS-R, and EHFScBS-9 tools was tested for use on an Arabic-speaking

population. First, item analysis was done to describe how items fit together. Second, a

Cronbach's alpha score was calculated and reported under each subscale above.

Testing Formal Hypotheses

This dissertation proposed two aims: (a) to identify patterns of self-care behaviors among

adults with HF in Oman and (b) to quantify the associations between self-care behaviors and

HRQOL. Data were collected from patients with chronic HF attending a tertiary hospital that

received different cardiovascular cases from all the regions of Oman. After including a full

characterization and description of self-care behaviors and QOL, latent-class analysis was used

to identify common patterns of self-care behaviors that differentiate patient skills in self-care. I

also attempted to identify the characteristics of patients who engaged in more favorable self-care

behaviors.

Hypothesis 1.1. Multiple patterns of self-care behaviors can be identified among

chronic HF patients enrolled in this study. Latent-class analysis distinguishes unobservable

subgroups within a sample. Identifying subgroups helps researchers to understand the risks and

patterns of certain behaviors (Lanza & Rhoades, 2013; Lee et al., 2017; Lee, Gelow, et al., 2015;

Lee, Mudd, et al., 2015). This helps to tailor interventions to groups that will benefit the most.

Latent-class analysis is better than deterministic alternatives because it considers the

combination of categorical and continuous variables and quantifies uncertainty in profile

membership (Lee et al., 2014; Lee et al., 2017). The reliability, availability, and maintainability

(RAM) criteria were used to choose the most robust model solution based on the Lo-Mendell

test. The Lo-Mendell-Rubin adjusted likelihood-ratio test and parametric bootstrap likelihood-

ratio test, convergence (model entropy near 1.0), the proportion of the sample in each profile (not less than 5%), and posterior probabilities (average probability of belonging to the ''most likely'' profile near 1.0) were used to compare the models of three profiles versus two profiles. Third, the observed classes were differentiated using appropriate statistical analysis of variance for three profiles. Fourth, effect sizes were calculated by class to gain insight into which elements of HF self-care were most discriminatory between or among classes. Once the classes were identified, they were used as categorical variables to examine the relationship between self-care and HRQOL.

Hypothesis 1.2. Multiple factors, such as age, gender, and attitudes of perceived control, will determine the better self-care patterns. To identify the determinants of a favorable self-care class among the three classes, we used multinomial regression. Comparisons between among groups were done prior to testing the relationship. We included measured variables of self-care, such as age and gender, which were shown in the literature to affect self-care behaviors.

Hypothesis 2.1. Better self-care behaviors individually or in patterns will be associated with better HRQOL. First, HRQOL was regressed to the total scores of each of the maintenance and management subscales of SCHFI v-6.2maintenance and management subscales, and consultative-behaviors subscale in the EHFScB-9. Second, a multivariate linear regression was used to test the relationship between self-care classes as categorical variables with HRQOL. Situational factors were included in each of the model as controls.

All analyses were performed using Stata/MP (Version 12, StataCorp, College Station, TX), SPSS (Version 25), and Mplus 6.0 (Muthén & Muthén, Los Angeles, CA). The results of this study are presented in Chapter 4.

Chapter 4: Results

Purpose

This chapter presents the results of this dissertation. A detailed description of the
preliminary analysis is first presented. The sample's characteristics, in terms of demographic
information and HF-related characteristics, are also described. Subsequently, the results of each
proposed hypothesis in each aim is presented, along with tables, where appropriate.

Preliminary Analysis: Exploration of Data

The participants in this study were recruited from an outpatient clinic using the eligibility
criteria outlined in Chapter 3. Patients who chose not to participate were mostly not interested or
too sick, or they did not feel they had time to participate. However, the vast majority of the
patients who were approached agreed to be in the study. A total of 105 participants were
recruited in this study. The data were examined for distribution and outliers. All main study
variables were normally distributed, and no outliers were identified that may affect analysis of
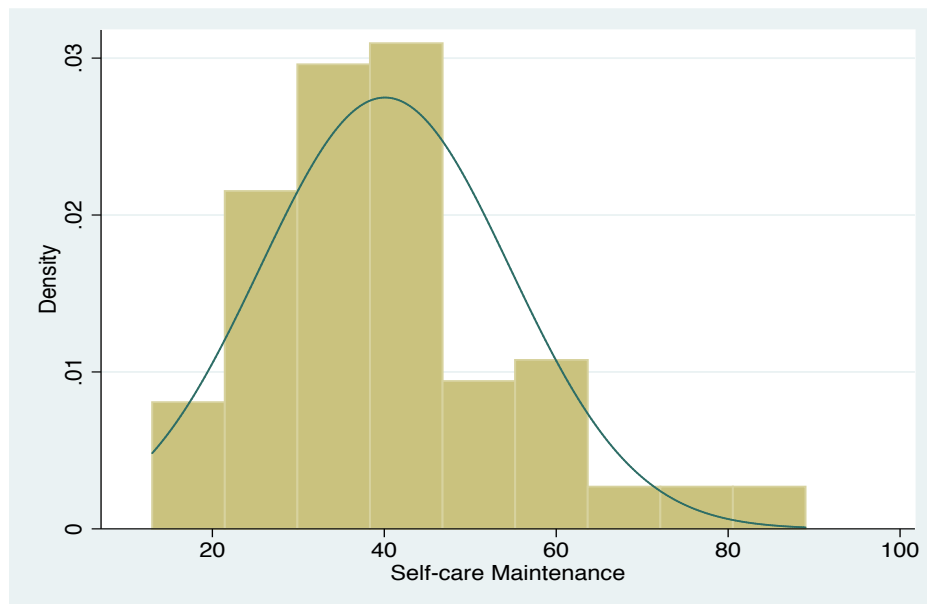the main aims (see Figures 2–4).

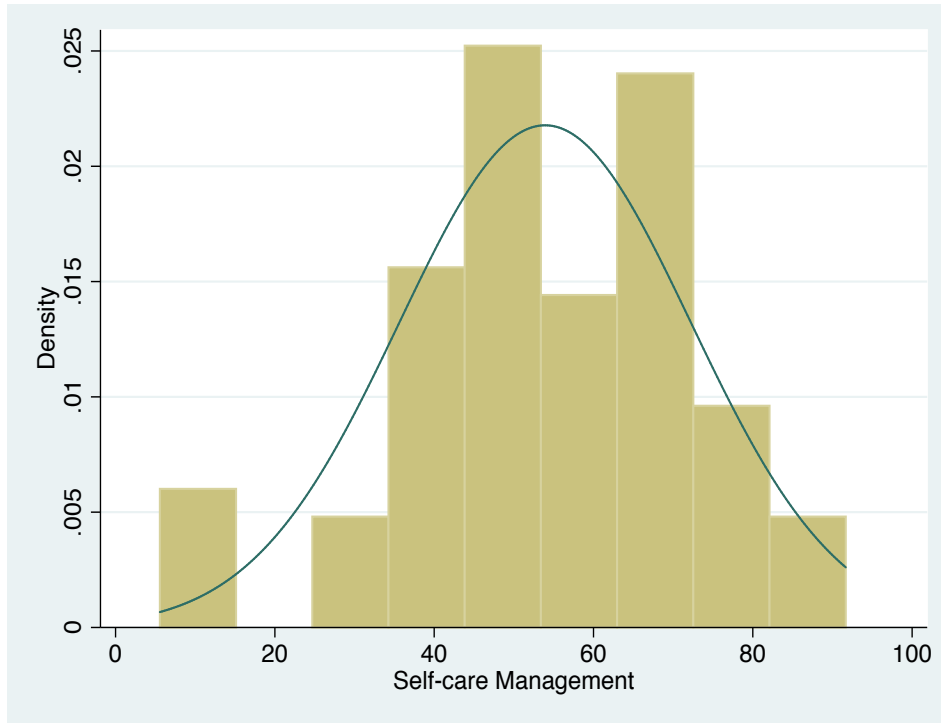*Figure 2*. Self-care maintenance distribution.

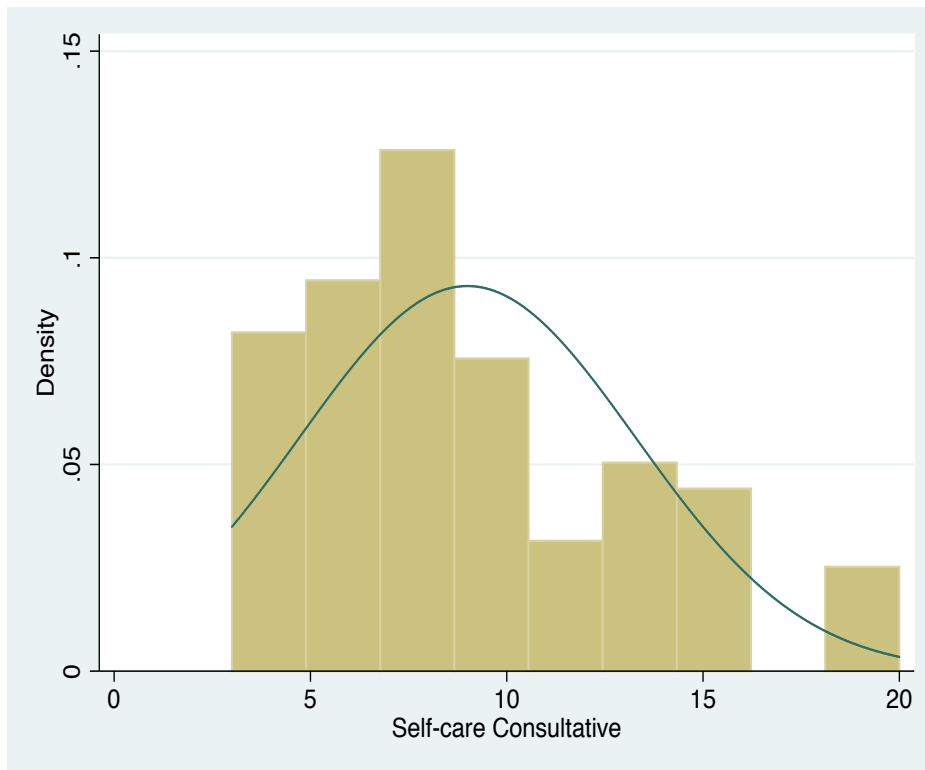*Figure 3*. Self-care management distribution.

Figure 4. Self-care consultative behaviors distribution.

Sample Characteristics

A total sample of 89 patients was included in the analysis. The remaining 16 patients

were not included due to missing data in the main study outcome of HRQOL. The

sociodemographic and clinical characteristics of the sample are described in Table 1. In short, the

sample was nearly equal in terms of males and females, and they were mostly married. Most of

the participants were unemployed, but most the sample expressed having adequate income.

Interestingly, the proportion of educated participants who received from less than high school to

doctoral education was nearly equal to the proportion of those who reported receiving no formal

education. The sample was relatively healthy, with self- reported current general health mean of

3.3 (± 0.96) on a range from 1 to 5, with 1 being *excellent* and 5 being *poor*, as well as

comorbidities and a good average left ventricular ejection fraction (LVEF). The participants also

had good health promotion activities, in that most of them did not smoke or drink alcohol.

However, more than half of the sample were physically inactive, reporting no exercise during the

previous week. The sample has above average perceived control attitude.

Table 1

*Characteristics of the Sample (*n *= 89)*

	Mean ± *SD*	*n* (%)
Age (years)	61.52 ± 14.80	
Gender		
Female		48 (53.93)
Marital status		
Married		64 (71.91)
Have someone to confide in (% yes)		85 (96.59)
Quality of social support (1–4)	3.22 ± .67	

Education
        Have no formal education   45 (50.56)
        Educated   44 (49.44)
Employment
        Employed   14 (15.91)
        Unemployed   74 (84.09)

Economic status
        Adequate   83 (93.26)
        Inadequate   6 (6.74)
Smoking history
        Smoker   1 (1.14)
        Nonsmoker   87 (98.86)
Drinking history
        Drink   1 (1.19)
        Never drank   83 (98.81)
Exercise in the past week
        Exercised   39 (45.35)
        Didn't Exercise   47 (54.65)

Self-reported current general health (1–5)   3.28 ± 1.02

Self-reported health compared to 1 year ago (1-5)   2.41 ± 1.19

Control attitude (8–34)   19.55 ± 5.81

Comorbidities (0–7)   3.01 ± 1.74

Left ventricular ejection fraction (16–73)   40.64 ± 13.68

Heart failure primary etiology
        Ischemic   40 (44.94)
        Nonischemic*   49 (55.06)

Note. *Nonischemic: Hypertensive, idiopathic, vulvular, alcohol related, others.

Preliminary Analysis: Self-Care Behaviors

Self-care behaviors overall were low in this study, in comparison to what has been observed in the HF self-care literature. As detailed in Table 2, self-care maintenance was lower than self-care management (scores range from 0 to 100, with higher values indicating better performance). These findings indicate that HF patients in Oman adhere less to behaviors that maintain health and manage symptoms. However, participants indicated better performance in consulting with their health-care providers in response to HF symptoms (scale ranges from 4–20, with higher values indicating lower consulting behaviors). A pairwise correlation test showed that self-care behaviors were not correlated with each other.

Table 2

Study Measures

Measure	Mean ± *SD*
Self-care maintenance[a]	40.08 ± 14.51
Self-care management[a]	53.31± 19.20
Self-care consultative[b]	9 ± 4.33
Health-related quality of life[c]	65.02 ± 20.31

Note. a = measured with SCHFI, b = measured with ESCHF-B, c = measured with EQOL-5D-3L VAS, *SD* = standard deviation.

A series of preliminary analyses were done to better describe how self-care behaviors (i.e., maintenance, management, and consultative behaviors) are associated with person, problem, and environment factors. For the continuous variables (e.g., age, quality of social support), a series of correlations with each self-care behavior were examined. For the categorical variables, such as gender, a Student *t*-test was used. Based on the situational theory of HF self-care and the known factors that affect self-care in HF patients, eight situational factors be

included in the analysis: age, gender, comorbidities, self-care confidence, education, social

support, LVEF, and control attitude. All assumptions for each test were ensured before

conducting the analysis as outlined in Chapter 3.

Self-Care Maintenance

In the unadjusted models, self-care maintenance was significantly positively correlated

with self-care confidence ($r = .331$, $p = .001$). That is, patients who had higher self-care

confidence were better at performing self-care maintenance behaviors compared to those who

had lower self-care confidence. In addition, perceived quality social support was also

significantly positively correlated with self-care maintenance behaviors ($r = .221$, $p = .039$);

patients who reported higher levels of social support had significantly better self-care

maintenance behaviors. On the other hand, self-care maintenance was significantly negatively

correlated with perceived control attitude ($r = -.355$, $p = .001$); patients who reported higher

levels of perceived control attitude had significantly less engagement in self-care maintenance

behaviors.

In the adjusted model (adj. $r^2 = .15$), after controlling for known situational factors that

may affect self-care (i.e., age, gender, comorbidities, self-care confidence, education, social

support, LVEF, and control attitude), self-care confidence and perceived control attitude had

significant positive relationships with self-care maintenance. Those who had higher self-care

confidence had better engagement in self-care maintenance behaviors, and those who reported

higher levels of perceived control attitude had significantly less engagement in self-care

maintenance behaviors, when controlling for other important factors. The determinants of self-

care maintenance are presented in Table 3.

Table 3

Determinants of Self-Care Maintenance

Covariates	Coefficient	SE	95% CI	p value
Age	0.018	0.11	[−0.19, 0.23]	.865
Gender: female	0.72	3.42	[−6.09, 7.53]	.834
Comorbidities	0.97	0.96	[−0.95, 2.89]	.318
Education: educated	1.28	3.18	[−5.05, 7.61]	.688
Self-care confidence	0.21	0.10	[0.00, 0.42]	**.045***
Social support	2.85	2.19	[−1.52, 7.22]	.197
LVEF	0.18	0.12	[−.11, .37]	.297
Control attitude	−0.65	0.30	[−1.26, .06]	**.032***

Note. LVEF = left ventricular ejection fraction, *SE* = standard error, CI = confidence interval, * significant at $p < .05$.

Self-Care Management

In the unadjusted model, self-care confidence had a significant positive relationship with self-care management ($r = .24$, $p = .0197$). Similarly, self-care management had a significant positive relationship with self-care confidence in the adjusted model controlling for age, gender, comorbidities, self-care confidence, education, social support, LVEF, and perceived control attitude. That is, patients who had higher self-care confidence had better engagement in self-care management behaviors when controlling for other factors.

Table 4

Determinants of Self-Care Management

Covariates	Coefficient	SE	95% CI	p value
Age	0.071	−0.15	[−0.22, 0.36]	.626
Gender	3.05	4.71	[−6.33, 12.43]	.520
Comorbidities	1.03	1.33	[−1.61, 3.68]	.438

Education	5.49	4.36	[−3.19, 14.17]	.211
Confidence	0.35	0.14	[0.06, 0.63]	**.017***
Social support	3.04	3.02	[−2.99, 9.06]	.319
LVEF	−0.17	0.17	[−0.50, 0.17]	.323
Control attitude	−0.59	0.39	[−0.19, 1.38]	.136

Notes. LVEF = left ventricular ejection fraction, *SE* = standard error, CI = confidence interval, * significant at *p* < .05

Self-Care Consultative

In the unadjusted models, self-care consultative behavior was significantly negatively correlated with perceived quality of social support ($r = −.25$, $p = .020$). When adjusting for situational factors that may affect self-care (i.e., age, gender, comorbidities, self-care confidence, education, social support, LVEF, and control attitude), perceived quality of social support was also the only significant predictor of self-care consultative behaviors. That is, those who perceived having no control over their own health were better at consulting health care providers when needed. The determinants of self-care consultative behaviors are presented in Table 5.

Table 5

Determinants of Self-Care Consultative Behaviors

Covariates	Coefficient	*SE*	95% CI	*p* value
Age	−0.01	0.04	[−0.08, 0.07]	.864
Gender: female	−0.23	1.12	[−2.47, 2.00]	.838
Comorbidities	0.17	0.33	[−0.49, 0.83]	.606
Education: educated	−0.27	1.08	[−2.41, 1.88]	.803
Confidence	−0.03	0.03	[−0.09, 0.035]	.379
Social support	−1.48	0.73	[−2.94, −0.01]	**.048**
LVEF	0.02	0.04	[−0.05, 0.11]	.514
Control Attitude	0.05	0.10	[−0.14, 0.25]	.588

Note. LVEF = left ventricular ejection fraction, *SE* = standard error, CI = confidence interval, * significant at *p* < .05.

Preliminary Analysis: Health-Related Quality of Life

Using the EQ5D-Index, overall HRQOL was high (mean .93 ± .04), with a score range from 0 to 1, and was also high as measured by the EQ5D-VAS (mean 65 ± 20.31). The sample did not differ by HRQOL when using the EQ5D-Index, and there were no significant associations between HRQOL and the above described situational factors. However, the EQ5D-VAS was more sensitive to capturing HRQOL in HF patients in this sample. Both measures were correlated with each other ($r = .28$, $p = .007$). This was an expected finding, given the global nature of the EQ5D; however, in the greater HF literature, the EQ5D-VAS was found to be sensitive to HRQOL in HF patients. Thus, the EQ5D-VAS was be used to describe HRQOL in subsequent analysis of this dissertation.

In the unadjusted model using the EQ5D-VAS, HRQOL was correlated with self-care confidence, self-reported quality of social support, perceived control attitude, and comorbidities. Patients who had higher self-care confidence had better HRQOL ($r = .31$, $p = .003$). Similarly, those who reported better quality of social support also had better HRQOL ($r = .27$, $p = .009$). On the other hand, those who reported higher control attitude had better HRQOL ($r = -.54$, $p = 0$), and those who had higher number of comorbidities had lower HRQOL ($r = -.25$, $p = .017$). Adjusting for the effect of situational factors (i.e., age, gender, comorbidities, self-care confidence, education, social support, LVEF, and control attitude), HRQOL had significant relationships with perceived quality of social support and perceived control attitude. Those who reported good quality of social support had better HRQOL, and those who had better control over their health had lower HRQOL, when adjusting for the effect of situational factors. Adjusted HRQOL model statistics are presented in Table 6.

Table 6

Determinants of Health-Related Quality of Life

Covariates	Coefficient	SE	95% CI	p value
Age	−0.14	0.13	[−0.41, 0.12]	.283
Gender	5.67	4.21	[−2.70, 14.04]	.181
Comorbidities	−0.22	1.21	[−2.64, 2.19]	.86
Education	-5.74	3.99	[−13.68, 2.20]	.154
Confidence	.22	0.12	[−13.69, 2.20]	.154
Social support	5.92	2.76	[0.43, 11.41]	**.035**[*]
LVEF	−0.09	0.15	[−0.39, 0.21]	.565
Control attitude	−1.54	0.37	[−2.27, −0.82]	**.000**[**]

Note. LVEF = left ventricular ejection fraction, *SE* = standard error, CI = confidence interval, * significant at *p* < .05, ** significant at *p* < .001.

Formal Hypothesis Testing: Aim 1

Hypothesis 1.1. Multiple Patterns of Self-Care Behaviors Can Be Identified Among

Chronic HF Patients Enrolled in This Study

Identification of self-care patterns. A latent class mixture analysis was conducted to identify patterns of self-care behaviors. The best model was chosen to describe self-care patterns based on the model fit information. Three distinct latent classes were identified with good model fit information, LMR = 16.330, *p* = .009, bootstrap *p* = .012, posterior probabilities near 1 for all three classes (Class 1 = .93, Class 2 = .931, Class 3 = .91), entropy near 1 (.833), Bayesian information criteria (BIC) lower than the other alternatives (BIC: 1,969.96). Class 1 was named lower self-care pattern, Class 2 was named consultative-focused behaviors, and Class 3 was named higher self-care pattern, based on each class's information. The differentiator between the three patterns was consultative behavior. Overall, the three patterns differed significantly in terms of age, exercise and perceived control attitude. Patient characteristics by self-care patterns

are presented on Table 7. We tested these differences to include any significant variable into the next model of self-care pattern determinants. Age (dichotomized) and perceived control attitude were among the eight situational factors selected for the analysis. Although significant differences were noted among the groups, we decided not to include the exercise variable due to its collinearity with self-care maintenance, which may affect the results. Hypothesis 1.1 was confirmed. Table 8 presents unadjusted results of each of the three patterns.

Table 7

*Patient Characteristics by Self-Care Patterns (*n *= 89)*

Characteristic	Lower self-care (*n* = 19)	Higher self-care (*n* = 6)	Consultative-focused behaviors (*n* = 64)	F or X^2, p value
Age (years)	58.26 ± 14.31	61 ± 9.61	62.53 ± 15.36	2.07, **.009***
Gender (female)	10 (52.63 %)	2 (33.33%)	36 (56.25%)	1.18, .659
Marital status (married)	12 (63.16%)	5 (83.33%)	47 (73.44%)	1.18, .554
Have someone to confide in	18 (94.74%)	6 (100%)	61 (96.83%)	0.42, .810
Quality of social support	3.17 ± 0.61	3.33 ± 0.52	3.25 ± .73	0.63, .600
Education (educated)	9 (47.37%)	5 (83.33%)	30 (46.88%)	2.96, .228
Currently employed	0 (0.00%)	2 (33.33%)	12 (18.75%)	5.15, .076
Economic status (adequate)	18 (94.74%)	5 (83.33%)	60 (93.75%)	1.03, .597
Smoking history (nonsmoker)	17 (94.44%)	6 (100.00%)	64 (100.00%)	3.93, .140
Drinking history (never drank)	17 (100.00%)	6 (100.00%)	60 (98.36%)	0.38, .826
Exercised during the past week	4 (23.53%)	6 (100.00%)	29 (46.03%)	10.50, **.005***

Self-reported current general health	3.53 ± 1.17	3.17 ± 0.41	3.22 ± 1.02	0.92, .458
Self-reported health compared to 1 year ago	2.74 ± 1.37	1.67 ± 1.03	2.39 ± 1.13	1.35, .257
Control attitude	20.79 ± 5.98	15.33 ± 5.39	19.58 ± 5.70	1.81, **.033***
Comorbidities	3.37 ± 1.95	2.67 ± 1.03	2.94 ± 1.73	0.57, .749
Left ventricular ejection fraction	41.53 ± 15.49	46.83 ± 13.82	39.78 ±13.15	0.99, .508
Heart failure primary etiology (ischemic)	9 (47.37%)	3 (50.00%)	28 (43.75%)	0.14, .931

Note. * significant at $p < .01$.

Characteristics of the lower self-care pattern. A total of 21% ($n = 19$) of the sample belonged to this pattern. The average probability of class membership was 93%. That is, there was a 93% chance that these participants belonged to this pattern correctly, versus a 7% chance of not being classified into this pattern. *F*-test statistics and effect sizes were used to describe the unadjusted difference between the self-care patterns, as presented in Table 8. The means of self-care behaviors in this group were lower for each of the self-care behaviors. That is, among the sample of HF patients in this study, a pattern of participants existed who did not perform self-care behaviors adequately. There was a significant difference in mean of self-care maintenance among the three patterns.

Characteristics of the higher self-care pattern. Only 7% ($n = 6$) of the sample belonged to the higher self-care pattern. The average probability of class membership was 91%, meaning that there was a 91% chance that these participants belonged to this pattern, versus a 9% chance of not being classified to this pattern. As mentioned above, Table 8 shows that the

means were higher for each of the self-care behaviors in comparison to for the lower self-care

pattern. That is, among the sample of HF patients in this study, there was a pattern of participants

who performed self-care behaviors better than participants in the other two patterns. Although

self-care management scores were slightly higher, it should be noted that this pattern—similar to

the other two patterns—has lower engagement in self-care management behavior and that the

difference between the three patterns was not significant.

Characteristics of the consultative-focused behaviors pattern. Most of the participants in this

study was categorized under this pattern ($n = 64$, 72%). Similar to those who belonged to the

lower self-care pattern, participants in this pattern had low self-care behaviors, although they

consulted their health care providers more often. That is, participants who belonged to this

pattern were more dependent on their health care providers. The average probability of class

membership was 93%. That is, there was a 93% chance that these participants belonged to this

pattern correctly, versus a 7% chance of not being classified into this pattern. F-test statistics and

effect sizes were used to describe the unadjusted differences between the self-care patterns, as

presented in Table 8. Unfortunately, the proportion of participants who belonged to this pattern

was far higher than the proportion of people who belonged to the higher self-care pattern.

Table 8

Unadjusted Differences in Self-Care Patterns

Self-care Behavior	Lower self-care Mean (SE) (n = 19)	Higher self-care Mean (SE) (n = 6)	Consultative-focused behaviors Mean (SE) (n = 64)	F statistic	p value	Effect size
Maintenance	39.07 (3.12)	72.79 (6.67)	36.78 (1.59)	34.68	**.000**[*]	0.45
Management	48.97 (6.02)	59.57 (8.35)	55.02 (2.35)	0.80	.454	0.02

| Consultative | 15.31 (0.88) | 5.32 (0.45) | 7.22 (0.45) | 97.94 | **.000**[*] | 0.71 |

Note. The higher consultative behavior scores mean lower consultative behaviors.
* significant at *p* < .0001.

Hypothesis 1.2. Multiple Factors Will Determine Membership in Self-Care Patterns Such as Age, Gender, and Perceived Control Attitudes

Determinants of self-care patterns. I hypothesized that several situational factors would characterize self-care patterns but found only one factor that was associated with self-care patterns. A multinomial logistic regression of the three self-care classes and the situational factors was examined to identify determinants of self-care patterns. In the adjusted model, only age group was positively significant. Those who were 50–65 years old were more likely to be in the consultative-focused behaviors pattern compared to those who were younger than 50 years or those who were older than 65 years old. Table 9 presents the adjusted model of self-care patterns and the situational factors.

Table 9

Determinants of Self-Care Patterns

Situational factor	Higher self-care pattern ($\beta \pm SE$)		Consultative-focused behaviors pattern ($\beta \pm SE$)	
	Adjusted	*Unadjusted*	*Adjusted*	*Unadjusted*
Age group				
50–65 years	18.14 ± 2,390.91	15.55 ± 1,187.12	**2.20 ± 0.96 ***	10.17 ± 0.69
Older than 65 years	16.18 ± 2,390.91	14.70±1187.12	1.53 ± 0.88	0.91 ± 0.68
Gender: female	−0.28 ± 1.30	−0.80 ± 0.98	0.35 ± 0.68	0.15 ± 0.52
Self-care confidence	0.07 ± 0.04	**0.09 ± 0.03**[*]	0.01 ± 0.02	0.02 ± 0.02
Education: educated	2.30 ± 1.57	1.71 ± 1.18	0.70 ± 0.73	−0.02 ± 0.52

Comorbidities	−0.45 ± 0.51	−0.24 ± 0.28	−0.23 ± 0.19	−0.14 ± 0.15
Social support	−0.19 ± 0.98	0.35 ± 0.70	0.25 ± 0.43	0.17 ± 0.38
LVEF	0.07 ± 0.05	0.03 ± 0.03	0.00 ± 0.02	−0.01 ± 0.02
Perceived control Attitude	0.07 ± 0.11	−0.20 ± 0.10	0.06 ± 0.05	−0.04 ± 0.04

Notes. Lower self-care pattern was set as the reference group. Age was used as a categorical variable (three groups: below 50 years [reference group], 51–64 years, and 65 years and above), LVEF = left ventricular ejection fraction, β = coefficient, *SE* = standard error.
 * significant at *p* < .05 level.

Hypothesis 2.1. Better Self-Care Behaviors Individually or in Patterns Will Be Associated With Better HRQOL

  Relationship with individual self-care behaviors. To test Hypothesis 2.1, linear regression was used to examine the relationship between each self-care behavior and HRQOL. In the unadjusted models of self-care behaviors and HRQOL, self-care maintenance and consultative behaviors were significant predictors of HRQOL. Those who were more engaged in maintenance behaviors also had better HRQOL, but those who were more engaged in consultative behaviors had worse HRQOL. However, when adjusting for the situational factors, self-care maintenance behavior was no longer a predictor of HRQOL. On the other hand, after adjusting for the situational factors, self-care consultative behavior still predicted HRQOL. That is when controlling for the situational factors known to affect both HRQOL and self-care, those who consulted their health care providers also had worse HRQOL. Self-care management behavior was not a predictor of HRQOL. Table 10 presents the adjusted and unadjusted relationships between self-care behaviors and HRQOL.

Table 10

Relationship Between Health-Related Quality of Life and Self-Care Behaviors

Unadjusted estimates

	Model 1	Model 2	Model 3
	β ± *SE*, *p*-value	β ± *SE*, *p*-value	β ± *SE*, *p*-value
Self-care maintenance	**0.30 ± 0.15, *p* = .040[*]**		
Self-care management		−0.07 ± .12, *p* = .534	
Self-care consultative			**-1.49 ± .50, *p* = .004[*]**

Adjusted models with predictors

	Model 1 (*n* = 86) β ± SE, *p*-value	**Model 2 (*n* = 85)** β ± SE, p-value	**Model 3 (*n* = 82)** β ± SE, p-value
Self-care maintenance	.08 ± .14, *p* = .575		
Self-care management		−0.04 ± .11, *p* = .723	
Self-care consultative			**−1.03 ± .47, *p* = .030[*]**
Age	−0.20 ± .13, *p* = .134	−0.20 ± .14, *p* = .157	−0.22 ± .14, *p* = .112
Gender: Female	6.32 ± 4.37, *p* = .152	4.58 ± 4.51, *p* = .314	5.39 ± 4.34, *p* = .219
Comorbidities	−0.769 ± 1.21, p = .527	−0.91 ± 1.24, p = .465	−0.72 ± 1.25, *p* = .565
LVEF	−0.09 ± .15, *p* = .585	−0.04 ± .16, *p* = .803	−0.035 ± .16, *p* = .820
Self-care confidence	**0.31 ± 0.13, *p* = .021[*]**	**.28 ± .14, p = .047[*]**	**.26 ± .12, p = .040[*]**
Education	−7.29 ± 4.09, *p* = .079	−6.85 ± 4.26, *p* = .112	−7.48 ± 4.21, *p* = .080
Social Support	**6.39 ± 2.82, *p* = .026[*]**	**6.46 ± 2.89, *p* = .029[*]**	5.30 ± 2.88, *p* = .070
Perceived Control Attitude Higher Level	**−14.80 ± 4.06, *p* = 0^{**}**	**−15.18 ± 4.17, *p* = 0^{**}**	**−15.14 ± 4.08, *p* = 0^{**}**
Adj. r^2	.31	.26	.34

Notes. **Model 1** = HRQOL and self-care maintenance, **Model 2** = HRQOL and self-care management, **Model 3** = HRQOL and self-care consultative. The perceived control over attitude variable (dichotomized) and lower level were set as the reference group. LVEF = left ventricular ejection fraction, β = coefficient, *SE* = standard error. * significant at *p* < .05 level, **significant at *p* < .001.

Relationship with patterns of self-care. Linear regression was used to examine the relationship between HRQOL and three self-care patterns. There was a significant positive relationship between self-care pattern membership and HRQOL in the unadjusted model. Specifically, those in the consultative-focused pattern had better HRQOL compared to those in the higher or lower self-care patterns. Even when controlling for situational factors that are known to affect self-care and HRQOL, self-care patterns were still a predictor of better HRQOL. Those who belonged to the consultative-focused pattern also had better HRQOL compared to those in the lower or higher self-care patterns. Higher perceived control of attitude level, self-care confidence, and self-reported quality of social support were significant predictors of HRQOL in this model. Those with higher perceived quality of social support and higher confidence also had better HRQOL. Interestingly, those who had higher perceived control attitude level had lower HRQOL. The final model explained 43% (r^2 = .43, adj. r^2 = .35) of the variance in HRQOL. The estimated relationship patterns between HRQOL and self-care patterns are presented in Table 11.

Table 11

Relationship Between HRQOL and Self-Care Patterns

	Unadjusted estimates B ± SE, *p*-value		
Higher self-care pattern	16.02 ± 9.30, *p* = .089		
Consultative-focused Pattern	**11.10 ± 5.19, *p* = .023***		

| | Adjusted model | | |
Predictors of HRQOL	**Coefficient**	***SE***	***p* value**	**95% CI**
Self-care pattern				
Higher self-care	11.29	8.28	.177	[−5.20, 27.78]
Consultative-focused	11.76	4.49	**.011***	[2.81, 20.71]

Age	−0.26	0.13	.054	[−0.52, 0.01]
Gender: female	5.22	4.15	.212	[−3.04, 13.48]
Comorbidities	−0.48	1.17	.681	[−2.82, 1.85]
LVEF	−0.04	0.15	.810	[−0.34, 0.26]
Self-care confidence	0.25	0.12	**.041**[*]	[0.01, 0.49]
Education: educated	−7.31	3.97	.070	[−15.22, 0.61]
Social support	6.52	2.69	**.018**[*]	[1.17, 11.88]
Perceived control attitude				
Higher level	−16.74	3.86	**.000**[**]	[−24.43, −9.05]

Note. The lower self-care pattern was set as the baseline, perceived control attitude was used as a categorical variable, and the lower level was set as the base (dichotomized at a score of 19 and above for the higher level and below a core of 19 for the lower level). HRQOL = health related quality of life, LVEF = left ventricular ejection fraction, *SE* = standard error, CI = confidence interval. *significance at *p* < .05, **significance at *p* < .0001.

Summary

In this chapter, the results of the study analysis were presented. The main aims of this study were examined using the appropriate statistical tests. All three hypotheses proposed in this study were confirmed. The findings and conclusion are discussed in Chapter 5.

Chapter 5: Discussion

Purpose

The overall goal of this dissertation was to further the understanding of the association between self-care behaviors and HRQOL in adults with HF in Oman. This chapter builds upon Chapter 4 by interpreting the findings of this dissertation work in the context of the greater HF literature. Implications from these findings, limitations, strengths, and recommendations are discussed below.

Summary of Findings

The aims of this dissertation were to, *first*, identify patterns of self-care behaviors among adults with HF in Oman and, *second*, to quantify the associations between self-care behaviors and HRQOL among chronic HF patients in Oman. Three main hypotheses were proposed. *First*, multiple patterns of self-care behaviors can be identified among the chronic HF patients enrolled in this study. *Second*, multiple factors will determine the better self-care patterns, such as age, gender, and perceived control attitude. *Third*, better self-care behaviors individually or in patterns will be associated with better HRQOL. The findings of this dissertation are within what was anticipated. *First*, three patterns of self-care were identified. *Second*, only age determined membership in the better self-care pattern. *Third*, significant positive associations were found between HRQOL and each self-care behavior, both individually and in patterns. Each of these major findings are discussed below.

Heart Failure Patients' Self-Care in Oman: Subgroups Versus One Group

Overall, the HF self-care behaviors among patients enrolled in this study were poorer in comparison to patients other countries (Auld et al., 2017). In Oman, HF self-care behaviors are currently undocumented. However, similar to studies done on DM (Alrahbi, 2014; D'Souza et

al., 2015), self-care behaviors in the current sample were poor. This was an expected finding,

given the lack of health education and the unavailability of HF programs in Oman. Surprisingly,

self-care behaviors were poor regardless of the level of formal education. This is surprising

because self-care behaviors are influenced by literacy level (Cajita, Cajita, & Han, 2016). In

Oman, a shift in literacy was observed after its historical development starting in 1970, when

increasing literacy was one of the main goals (Moeness, 2010). For this reason, a difference in

self-care by age was expected. That is, younger and more educated patients would be expected to

have higher self-care than those who were older and had received less or no education. However,

on the contrary, self-care was not different by age.

As proposed by the situation-specific theory of HF and similar to other HF studies done

in other countries, self-care confidence was related to self-care maintenance and management

behaviors (Riegel & Dickson, 2008). In addition, levels of self-care varied according to person,

problem, and environment factors. For example, engagement in self-care maintenance varied by

confidence and perceived control attitude. Engagement in self-care management varied by

confidence. Engagement in self-care consultative behaviors varied by the quality of one's social

support. However, self-care behaviors do not exist individually, and patients often attempt to do

the three behaviors together. Indeed, as clinicians, we educate patients on and encourage them to

do all of them, when appropriate. Similar to innovative research in the United States (Lee et al.,

2017; Lee, Gelow, et al., 2015), the current study also found that patients engage in self-care

behaviors in patterns, which we believe has more clinical utility.

Using latent class mixture modeling to examine naturally existing patterns that were not

preidentified, three patterns of self-care were found among HF patients in Oman: lower self-care,

higher self-care, and consultative-focused behavior patterns. This is not surprising, given the

heterogeneous nature of the HF condition, which is often concurrent with competing

comorbidities, and the variability of engagement in self-care behaviors across person, problem,

and environment factors. The identification of these three patterns supports the qualitative

findings of Dickson, Deatrick, Riegel, et al. (2008), who described a typology of HF patients (*n*

= 41) as novice, expert, or inconsistent in self-care management. This finding was then

confirmed quantitatively through Riegel, Lee, Albert, et al.'s (2011) study on 689 adults with

HF. In addition, in another important work using cluster analysis, Vellon et al. (2017) identified

four typologies of self-care in HF patients.

Although I did not find an inconsistent group, this may be due to the smaller sample or

the state of self-care in Oman. Instead, a majority of the sample belonged to the consultative

behaviors pattern, which was characterized by low self-care behaviors, similar to what we

observed with the lower self-care pattern but with better consultative behaviors. Additionally,

Lee, Gelow, et al. (2015) used latent class mixture analysis (LCMA) to examine self-response

behaviors at the item level and found two distinct classes (novice and expert) of consulting

behaviors and three distinct classes (novice, inconsistent, and expert) of self-care management

behaviors (Lee et al., 2017; Lee, Gelow, et al., 2015). Similarly, they uncovered patient patterns

along a continuum of engagement from low to high. The current study expands on this work by

including all self-care subscales and by being the first to examine underlying patterns in an

Omani sample.

Patients with the higher self-care pattern performed self-care maintenance behaviors

better than patients with the lower self-care pattern and were also better at consulting their health

care providers. On the other hand, patients who belonged to the lower self-care pattern were less

adherent to self-care maintenance behaviors and were less likely to consult with their health care

providers. This is an anticipated finding and is in line with findings from other similar studies (Lee et al., 2017; Lee, Gelow, et al., 2015; Riegel, Lee, Dickson, et al., 2011). In addition, those in the consultative behaviors-focused pattern were also less adherent to self-care maintenance but were better at consulting their health care providers. This may be because of the inability to manage their condition; therefore, they depend more on their health care providers.

Self-care management was similar within all three self-care patterns. This finding was surprising and unexpected, particularly given the study by Lee, Gelow, et al. (2015), which found patterns when only examining self-response behaviors. More research is needed to understand self-care management in Oman, but this may indicate the shortcoming of health care in Oman, where patients are not being educated to manage their symptoms nor having their management enhanced; instead, HF patients are solely dependent on their health care providers. This unforeseen finding may be because of the lack of variability in self-care management. Managing symptoms requires judgment and decision making, which are challenging to HF patients. For example, because of the multiple competing comorbidities, patients may not recognize their symptoms as being related to HF.

Self-care management behaviors are challenging. For instance, Item 11 of the Self-Care Management Scale used in this study states, "If you had trouble breathing or ankle swelling in the past month, how quickly did you recognize it as a symptom of HF?" This item asks participants to rate their recognition of ankle swelling or trouble breathing as a symptom of HF, versus being related to another condition. It appears that the patients in this study had difficulty recognizing HF symptoms, which was reflected in their relatively low self-care management scores overall. The low self-care management scores may also be related to patients' inability to decide to act when symptoms occur. For example, Item 14 of the self-care management scale

states, "If you have trouble breathing or have ankle swelling, how likely are you to take an extra water pill?" This item asked the respondents to rate their ability to act by self-medicating. However, self-administration of diuretics is not regularly encouraged by health care providers, and it is also dependent on patients' willingness and motivation (Barbaranelli et al., 2014). In Oman, in a study of patients with acute coronary syndrome, patients who had comorbid HF were found to have poor adherence to medications (Al-Zakwani et al., 2011), which questions their ability to take a more challenging decision to self-medicate. Furthermore, the unavailability of literature about self-care management of any disease condition in Oman limits the comparison of this study to other studies conducted in Oman and the field's ability to understand self-care management.

In sum, self-care among HF patients in Oman can be classified into three patterns: higher self-care pattern, lower self-care pattern, and consultative-focused behaviors pattern. It is better to approach HF patients as subgroups versus as one group in clinical practice and research.

Determinants of Self-Care Patterns among Heart Failure Patients in Oman

As theorized by the situational theory of HF self-care, decisions to engage in self-care behaviors are thought to be based on interactions among the situational factors of personal characteristics (e.g., age), the problem's manifestations (e.g., multi-comorbidities), and the environment (e.g., social support; Riegel et al., 2016). Eight factors were tested as possible determinants to describe the profile of the high self-care pattern based on a theoretical/empirical approach. Among these factors, only age group was found to determine self-care patterns. Those who were 50–65 years old were more likely to be in the consultative-focused behavior pattern, compared to those who were younger than 50 years old or those who were older than 65 years old. This is an interesting finding and may be clinically meaningful. Those who are younger may

be less debilitated by HF symptoms and may not see the need to refer to their health care

provider. Those older than 65 years old may have been having HF for longer periods of time

compared to patients aged 50 to 65 years old, which may have helped them to adapt and develop

independence from their health care provider. It is worth noting here that we maximized my

efforts to characterize the HF sample to better describe the sample in general and to identify what

determines HF self-care, as recommended by the latest position statement in nursing research on

HF (Stamp et al., 2018). However, most of the information needed to describe the sample was

incomplete in the patients' charts.

To summarize, we hypothesized that the high self-care pattern would be determined by

multiple factors, yet only age group was identified as a determinant of self-care membership.

This requires further investigation because it may mean that no factors differentiate self-care

membership in clinical practice, which would be challenging. On the other hand, the small

sample size may have obscured our ability to identify the determinants of self-care patterns.

Health-Related Quality of Life Is Associated With Self-Care in Heart Failure Patients in Oman

Engaging in greater levels of self-care behaviors is theorized to lead to better patient

outcomes, including better HRQOL (Riegel et al., 2016). Self-care engagement, however, is

dependent on situational factors. As previously explained, situational factors that influence self-

care behaviors may differ by environment, problem, and person (Riegel et al., 2016). In addition,

testing this relationship with individual self-care behaviors may differ from testing patterns of

self-care collectively.

Individually

Across the three self-care behaviors, there was an association with HRQOL, except for

self-care management. To further explain, patients who adhered to self-care maintenance behaviors also had a high HRQOL compared to those who did adhere to such behaviors. This is an expected finding given that self-care maintenance behaviors promote good wellbeing among HF patients (Chung et al., 2015; Marti et al., 2013). This is also in line with what D'Souza et al. (2016) found in DM patients in Oman. Interestingly, patients who consulted with their health care providers had lower HRQOL. This could be because those with lower HRQOL also had other more severe limitations and therefore need to consult with their health care providers more than those who are relatively stable and have a good HRQOL. This is similar to results found by what Peters-Klimm et al. (2012), who found a negative relationship between HRQOL and self-care in a sample of patients recruited from an outpatient clinic. This negative finding was explained because of patients' unawareness of symptoms when carrying out activities of daily living and because of coping with the fact and accepting that HF is an irreversible condition, which leads patients to not care much about self-care practices and indicated good HRQOL. This may also be explained by the dependent nature of patients who are unable to figure out how to manage their symptoms and thus depend highly on their health care providers.

Interestingly, there was no relationship between HRQOL and self-care management. This could be explained by the specific nature of self-care management of HF and the opposite general nature of the EQ5D-3L-VAS, which is not specific to HF. It may also be because the sample was relatively stable (LVEF mean of 40) or because of a lack of variability in self-care management. Similar to this finding, Liu et al. (2014), Buck et al. (2012), and Nesbitt et al. (2014) found no association between HRQOL and self-care. Note that all three of the abovementioned studies included patients who were relatively stable and were recruited from

outpatient and primary care clinics, except for Buck et al. (2012), whose sample was recruited from inpatient and outpatient settings.

After adjusting for situational factors, only self-care consultative behaviors predicted HRQOL. That is, even when controlling for situational factors, higher engagement in consultative behaviors was associated with lower HRQOL, as previously explained. Interestingly, across the three self-care behaviors, we noticed that self-care confidence, perceived social support, and higher levels of perceived control attitude were significant predictors of HRQOL after controlling for self-care behaviors. Those who had higher confidence and higher perception of social support also had better HRQOL than their counterparts. On the other hand, those who had higher perceived control attitude had lower HRQOL. This could be explained from an Eastern cultural perspective—that is, in contrast to the Western culture—in that HRQOL is known to be predicted by higher levels of perceived control attitude (Heo et al., 2014); however, this finding similar to what Banerjee et al. (2014) found. Further research is needed to understand the interplay between individual self-care behaviors and HRQOL while considering situational factors. It is worth noting here that the finding that self-care did not predict HRQOL when adjusting for situational factors in both self-care maintenance and management behaviors, which is similar to the finding by D'Souza et al. (2016). D'Souza et al. (2016) found that self-care was not a predictor of HRQOL in DM patients when controlling for situational factors (i.e., higher levels of education, increased ability to manage diabetes, increased in age, moderate ability to assume activities of daily living, higher knowledge of diabetes, and adherence to medication).

In summary, across the three self-care behaviors, an association with HRQOL was found, except for self-care management. The finding of no association with self-care management is

best explained by the lack of a more specific HF-related quality-of-life measure that takes into

consideration the specific symptoms of fluid congestion and by the stability of the sample.

However, in real-life practice, clinicians need to make decisions quickly and uniformly across

patient groups; thus, a more comprehensive, naturally occurring option like classifying patients

will be more helpful.

Patterns

We found that HRQOL was associated with patterns of self-care. That is, when

classifying patients into subgroups, the relationship with self-care was significantly positive,

even when controlling for the situational factors. Specifically, those who belonged to the

consultative behavior-focused pattern had better HRQOL compared to those who belonged to the

higher or lower self-care patterns. When controlling for situational factors that are known to

affect self-care and HRQOL, self-care pattern membership was still a predictor of better

HRQOL. Those who belonged to the consultative-focused pattern also had better HRQOL

compared to those who were in the lower or higher self-care patterns, even when controlling for

situational factors. This is an interesting and unexpected finding, as when examined alongside

other self-care behaviors, self-care consultative behaviors have a positive and significant

relationship with HRQOL, versus when examined as an individual behavior. This is a very

important highlight of this dissertation: the pattern of patients who practiced poor maintenance

and management behaviors but consulted with their health care providers having better HRQOL,

which emphasizes that self-care behaviors are better examined as patterns versus as individual

indices. Unfortunately, the percentage of patients who belonged to the higher self-care pattern is

relatively. In addition, those who had higher perceived quality of social support and higher

confidence also had better HRQOL. Interestingly, those with higher perceived control attitude

levels had lower HRQOL. There was still a good amount of variability that was not explained by these situational factors, which warrants further future inquiry.

Implications

For Research

Findings from this study may benefit researchers in Oman and globally. The factors that influence self-care behaviors may differ by environment, situation and person (Riegel et al., 2016), so learning about self-care and its association with HRQOL in another culture is important to the HF literature. In this study, being aged between 50 and 65 years old was found to determine self-care pattern membership. In addition, the self-care scales that were translated to Arabic language, back translated, and validated for use by this study can be used to study self-care in countries or populations with similar linguistic backgrounds. Identifying self-care patterns is important and should be considered when planning or interpreting future studies. There is also a need to investigate self-care management and for more longitudinal research to understand these concepts over time. In addition, our findings that social support and self-care confidence is important to direct future research to investigate the effect of these two important factors on self-care.

For Practice

This was the first study both to recruit HF patients from an outpatient setting in Oman and to study chronic HF. Understanding the demographics of stable patients versus of the more acute participants from inpatient settings is crucial for further assessment and intervention. The overall self-care in this study was on the lower side, in comparison to patients in other nations. This finding draws the attention of health care providers to start evaluating self-care in clinical practice and increase their efforts to improve self-care practices in HF in Oman using a subgroup

approach to tailor those interventions. Regarding patterns, age group was found to determine the consultative behavior-focused pattern, whose patients had better HRQOL.

For Theory

The findings from this dissertation support what was theorized by the situational theory of heart failure self-care, in terms of the positive influence of self-care on health outcomes. They also draw upon the proposed situational factors of person, problem, and environment that influence self-care. In this study, we found that self-care confidence, perceived quality of social support, and perceived level of control attitude are important situational factors that affect the relationship between self-care and HRQOL. This adds to a body of literature in HF that looks at this relationship. These types of factors are potentially modifiable, which means that they are potential targets for intervention. Across patterns, age group was found to determine the consultative behavior-focused pattern, whose patients had better HRQOL. There is a need for the situational theory of HF self-care to consider cultural differences. For example, we found that lower control attitude was associated with higher HRQOL, which is the opposite of what has been observed in Western societies. Also, the theory must consider highlighting how time affects self-care and outcomes like HRQOL.

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Strengths

</div>

This was the first study in Oman and the Middle East to uncover the relationship between self-care and HRQOL. We confirmed the variability of self-care among HF patients. In terms of methodological strength, there was equal proportions of women and men recruited to the study by convenient sampling. This is unlike the majority of HF research globally, whose samples are often male dominated. Naturally occurring patterns of self-care that uncovered unseen subgroups in this sample was identified using the LCMM. Identifying these patterns will enhance future

tailored interventions for HF patients in Oman. This was also the first study to view patterns of

self-care by employing a holistic perspective involving all aspects of self-care behaviors (i.e.,

maintenance, management, consultative) and examining all aspects with HRQOL. In addition,

this study advanced science in both self-care and in HRQOL, which are both unknown and

needed areas for HF in Oman. The findings from this study can be generalized to other nearby

countries.

Limitations

The study had a cross-sectional design, which means that data were collected at one point

in time. This design allows associative inferences; however, causal inferences between self-care

and HRQOL are not possible. The sample was recruited using a convenience sampling method;

thus, patients who did not participate in this study may have been sicker than the participants

who were willing to participate, could have lost the chance to know important information. In

addition, patients were recruited from an outpatient clinic, where patients are more stable, as

compared to unstable patients who are hospitalized.

In terms of data collection, some of the required HF information, such as HF type, was

challenging to abstract because it was either not recorded or was difficult to find from

cardiologists' notes. The HRQOL measure used is generic and not specific to HF patients, and it

may not be sensitive enough to capture HRQOL that is affected by fluid congestion. Some of the

HF descriptions, like the stages, time from diagnosis, and NYHA class, were not recorded in

patients' charts by their health care providers and thus were not used in this study. Although

symptoms are essential when examining HRQOL, they were not measured in this study. This has

reduced understanding of the full picture of the relationship between self-care and HRQOL.

Missing data in the EQ-VAS also reduced the sample count in any model that was used to 98 patients.

Future Recommendations

Heart Failure self-care in Oman needs to be improved; to do so, health providers need to understand self-care and how it may affect health outcomes. First, health care providers are advised to improve their documentation of specific HF information, like the stage of the disease. Second, health care providers also need to emphasize health promotion behaviors like receiving the flu vaccine and reducing salt intake. Third, future research may be directed toward investigating providers' knowledge of HF management. In addition, a multicenter study from all of Oman is needed to recruit participants with different demographics—for example, those living in urban versus rural areas. Also, participants should be recruited from inpatient areas, where patients are at advanced stages of disease and may be sicker, and/or from community centers, in that community-dwelling patients can be different in managing their HF symptoms. Medical management of HF, such as using devices and/or medications, is important to identify in the future when examining the self-care of HF patients in Oman.

Using an HF-specific instrument to examine HRQOL may work better to understand HF patients' quality of life. In addition, future research can be extended from the patient level to inquire about how HF patients manage their disease at the familial and community levels. Also, HF self-care should be investigated in relation to other chronic diseases like HTN and DM.

Conclusion

In conclusion, HF self-care is not fully known in Oman, and self-care classifications are not well understood globally. Based on this cross-sectional study of a sample of 89 patients with HF, self-care can be classified into three patterns: the higher self-care pattern, lower self-care

pattern, and consultative behavior-focused pattern. To translate this new knowledge into practice, HF patients should be approached differently according to their level and pattern of self-care. It may be better for clinicians to measure self-care in clinical practice to help them identify patients with high or low self-care. We are still not sure about what is causing the higher self-care pattern in HF patients in Oman; however, the consultative behavior-focused pattern was determined by age group. Regardless of their low self-care maintenance and management behaviors, this self-care pattern had better HRQOL compared to those who were in the lower or higher patterns, which opens the scope for improving HRQOL through maximizing access to health care providers, in addition to improving the patients' maintenance and management behaviors.

Across the individual self-care behaviors, we found an association with HRQOL. We also found that self-care confidence, social support, and control attitude were very important factors that may influence HRQOL and self-care. In real-life practice, clinicians need to make decisions quickly and uniformly across patient groups. A more comprehensive and naturally occurring option of classifying patients into subgroups would be more helpful when attempting to improve health outcomes like HRQOL.

A positive significant relationship between self-care patterns and HRQOL was found. Regardless of the limitations of this dissertation, this is the first study to examine self-care and HRQOL as well as the relationship between the two. Knowledge from this study will help researchers and clinicians in Oman and throughout the developing world to understand self-care and HRQOL in HF patients. In addition, this was the first study to classify HF patients using all self-care behaviors, which revealed itself to be more effective when examining the relationship between self-care and health outcomes than using an average patient mean.

In sum, the novel contributions of this dissertation are the new understanding of another population and culture as well as the innovative approach of classifying patients, which will add to the global understanding of self-care based on patients' need in terms of self-care and HRQOL.

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Appendix A

Study Questionnaire

SOCIO-DEMOGRAPHICS

The following information is very important to us and will remain <u>confidential</u>. Please answer each question to the best of your ability.

1	**What is your gender?**	☐ Male	☐ Female

2 **Marital status:**
   - ☐ Single
   - ☐ Married
   - ☐ Divorced/Separated
   - ☐ Widowed

3	**Do you currently live with another person(s)?**	☐ No	☐ Yes
4	**Do you have someone to confide in?**	☐ No	☐ Yes

5 **How would you rate the quality of the support you receive?**
   - ☐ Poor
   - ☐ Satisfactory
   - ☐ Good
   - ☐ Very good

6 **What is the highest level of education you have completed?**
   - ☐ Less than high school
   - ☐ High school
   - ☐ Some college
   - ☐ Associate's degree

		☐ Bachelor's degree
		☐ Master's degree/ Professional degree
		☐ Doctoral degree

7	**Employment status:**	☐ Employed full or part time
		☐ Unemployed
		☐ On sick leave or disability
		☐ Homemaker
		☐ Retired due to heart failure
		☐ Retired not due to heart failure
		☐ Other (specify_____)

8	**Financially, would you say you:**	
		☐ Have more than enough
		☐ Have enough
		☐ Do not have enough

9	**Smoking history:**	☐ Current smoker (smoking within 1 month)
		☐ Recent smoker (stopped between 1 month and 1 year ago)
		☐ Former smoker (stopped more than 1 year ago)
		☐ Never smoked

10	**On average, how often do you drink alcoholic beverages**	
		☐ Never
		☐ 1 – 2 drinks per week
		☐ 3 – 7 drinks per week
		☐ 8 – 14 drinks per week
		☐ More than 14 drinks per week or more than 5 in one day

11   **During the past week, how much <u>total</u> time did you spend exercising (including weight training, walking, biking, swimming, or other types of aerobic exercise)?**

☐ None	☐ Less than 30 minutes	☐ 30 minutes to 1 hour	☐ 1 to 3 hours	☐ More than 3 hours

12   **In general, how would you rate your health now?**

☐ Excellent   ☐ Very Good   ☐ Good   ☐ Fair   ☐ Poor

13   **<u>Compared to 1 year ago</u>, how would you rate your health now?**

☐	☐	☐	☐	☐
Much better now than 1 year ago	Somewhat better now than 1 year ago	About the same as 1 year ago	Somewhat worse now than 1 year ago	Much worse now than 1 year ago

Please continue onto the next page.

EUROPEAN HEART FAILURE SELF-CARE BEHAVIOR SCALE

This scale contains statements about heart failure self-care. Respond to each statement by checking the box you think best applies to you. Even if you feel uncertain about a statement, check the box corresponding to the number you feel is most true for you.
 (check one box for each statement)

	I completely Agree		→		I don't agree at all
	1	2	3	4	5
I weigh myself every day	☐	☐	☐	☐	☐
If I get short of breath I take it easy	☐	☐	☐	☐	☐
If my shortness of breath increases I contact my doctor or nurse	☐	☐	☐	☐	☐
If my feet/legs become more swollen than usual I contact my doctor or nurse	☐	☐	☐	☐	☐
If I gain 5 pounds in one week I contact my doctor or nurse	☐	☐	☐	☐	☐
I limit the amount of fluids I drink (not more than 1½-2 liters/day)	☐	☐	☐	☐	☐
I take a rest during the day	☐	☐	☐	☐	☐
If I experience increased fatigue I contact my doctor or nurse	☐	☐	☐	☐	☐
I eat a low salt diet	☐	☐	☐	☐	☐
I take my medication as prescribed	☐	☐	☐	☐	☐
I get a flu shot every year	☐	☐	☐	☐	☐
I exercise regularly	☐	☐	☐	☐	☐

SELF-CARE OF HEART FAILURE INDEX

(ALL ANSWERS ARE CONFIDENTIAL)

Think about how you have been feeling in the last month (4 weeks) as you complete these items.

SECTION A:

Listed below are common instructions given to persons with heart failure.
How <u>routinely</u> do you do the following?

(Check one box for each question)

	Never or rarely	Sometimes	Frequently	Always or daily
1.Weigh yourself?	☐	☐	☐	☐
2.Check your ankles for swelling?	☐	☐	☐	☐
3.Try to avoid getting sick (e.g., flu shot, avoid ill people)?	☐	☐	☐	☐
4.Do some physical activity?	☐	☐	☐	☐
5.Keep doctor or nurse appointments?	☐	☐	☐	☐
6.Eat a low salt diet?	☐	☐	☐	☐
7.Exercise for 30 minutes?	☐	☐	☐	☐
8.Forget to take one of your medicines?	☐	☐	☐	☐
9.Ask for low salt items when eating out or visiting others?	☐	☐	☐	☐
10. Use a system (pill box, reminders) to help you remember your medicines?	☐	☐	☐	☐

SECTION B:

Many patients have symptoms due to their heart failure. <u>Trouble breathing and ankle swelling</u> are common symptoms of heart failure.

In the past month, have you had trouble breathing or ankle swelling? Check <u>one</u>.

☐ No
☐ Yes

11. **If** you had trouble breathing or ankle swelling in the past month…

(Check one box)

	Have not had these	I did not recognize it	Not Quickly	Somewhat Quickly	Quickly	Very Quickly
How quickly did you recognize it as a symptom of heart failure?	☐	☐	☐	☐	☐	☐

Listed below are remedies that people with heart failure use.

If you have trouble breathing or ankle swelling, how likely are you to try one of these remedies?

	Not Likely	Somewhat Likely	Likely	Very Likely
1. Reduce the salt in your diet	☐	☐	☐	☐
2. Reduce your fluid intake	☐	☐	☐	☐
3. Take an extra water pill	☐	☐	☐	☐
4. Call your doctor or nurse for guidance	☐	☐	☐	☐

(Check one box for each remedy)

5. Think of a remedy you tried the last time you had trouble breathing or ankle swelling,

	I did not try anything	Not Sure	Somewhat Sure	Sure	Very Sure
How sure were you that the remedy helped or did not help?	☐	☐	☐	☐	☐

(Check one box)

SECTION C:

In general, how confident are you that you can:

	Not Confident	Somewhat Confident	Very Confident	Extremely Confident
1. Keep yourself free of heart failure symptoms?	☐	☐	☐	☐

2. <u>Follow the treatment advice</u> you have been given?	☐	☐	☐	☐
3. <u>Evaluate the importance</u> of your symptoms?	☐	☐	☐	☐
4.<u>Recognize changes</u> in your health if they occur?	☐	☐	☐	☐
5.<u>Do something</u> that will relieve your symptoms?	☐	☐	☐	☐
6.<u>Evaluate</u> how well a remedy works?	☐	☐	☐	☐

(Check one box for each question)

The Control Attitudes Scale-Revised

Check one box for each statement

	I completely Agree	→			I don't agree at all
	1	2	3	4	5
1. If I do all the right things, I can successfully manage my heart condition.	☐	☐	☐	☐	☐
2. I can do a lot of things myself to cope with my heart condition.	☐	☐	☐	☐	☐
3. When I manage my personal life well, my heart condition does not bother me as much.	☐	☐	☐	☐	☐
4. I have considerable ability to control my symptoms.	☐	☐	☐	☐	☐
5. No matter what I do, or how hard I try, I just can't seem to get relief from my symptoms.	☐	☐	☐	☐	☐
6. I am coping effectively with my heart condition.	☐	☐	☐	☐	☐
7. Regarding my heart problems, I feel lots of control.	☐	☐	☐	☐	☐
8. Regarding my heart problems, I feel helpless.	☐	☐	☐	☐	☐

EUROPEAN QUALITY-OF-LIFE 5 DIMENSIONS

By placing a mark in one box in each group below, please indicate which statement best describes your own health state today.

Do not tick more than one box in each group.

Mobility

☐ I have no problems walking about

☐ I have some problems in walking about

☐ I am confined to bed

Self-care

☐ I have no problems with self-care

☐ I have some problems washing or dressing myself

☐ I am unable to wash or dress myself

Usual activities (e.g. work, study, housework, family or leisure activities)

☐ I have no problems with performing my usual activities

☐ I have some problems with performing my usual activities

☐ I am unable to perform my usual activities

Pain/Discomfort

☐ I have no pain or discomfort

☐ I have moderate pain or discomfort

☐ I have extreme pain or discomfort

Anxiety/Depression

☐ I am not anxious or depressed

☐ I am moderately anxious or depressed

☐ I am extremely anxious or depressed

Mark a line across this scale to show how good or bad you think your own health state is today.

OWN HEALTH SCALE

Best
imaginable
health state
100

Please write your number here:

Worst
imaginable
health state
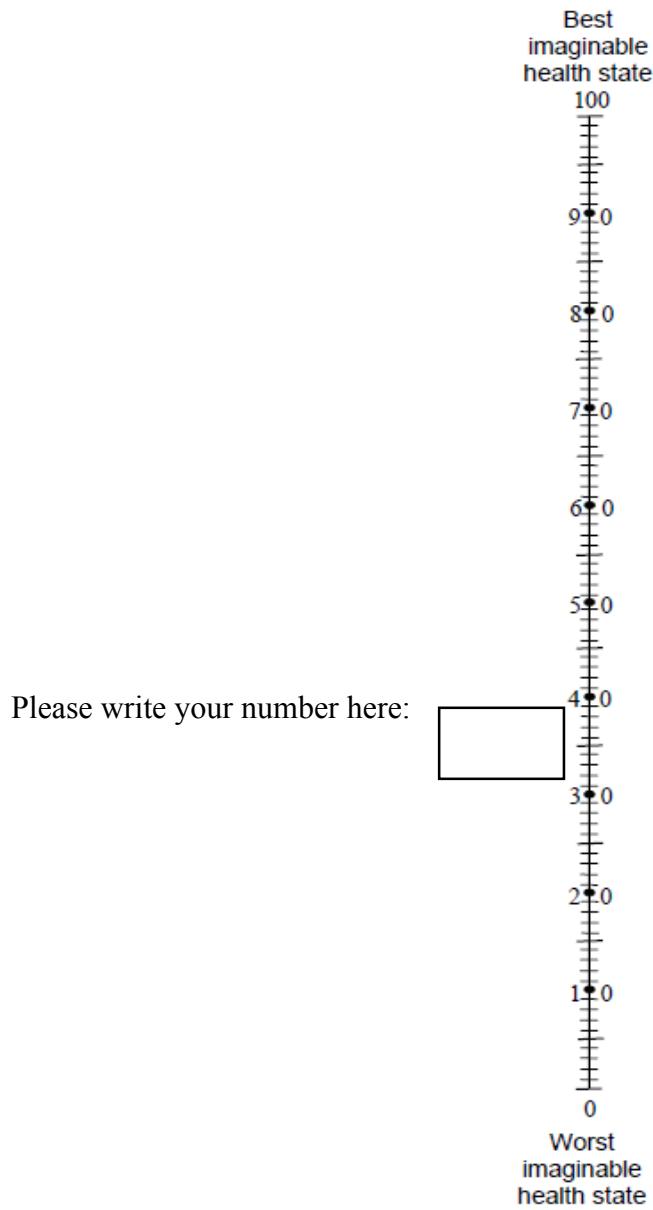
This is the end of the survey. Thank you very much for participating in this study.