

Factors Affecting Self-Care Adherence in Patients with Heart Failure in Saudi Arabia

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Certificate of Original Authorship

I, Hamdah Faied Alshammari, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in the Faculty of Health at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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List of Abbreviations

EF	Ejection Fraction
Embase	Excerpta Medica data BASE
BNP	Brain Natriuretic Peptide
CAS	Control Attitude Scale
CCI	Charlson Comorbidity Index
CFIR	Consolidated Framework for Implementation Research
CINAHL	Cumulative Index to Nursing and Allied Health Literature
COPD	Chronic Pulmonary Obstructive Diseases
CESD	Center for Epidemiologic Studies Depression Scale
DASI	Duke Activity Status Index
DHFKS	Dutch Heart Failure Knowledge Scale
DM	Diabetes Mellitus
EHFScBS	European Heart Failure Self-care Behaviour Scale
ENRICHD	Enhancing Recovery In Coronary Heart Disease
FRAIL	Fatigue, Resistance, Ambulation, Illness, and Loss of weight
GAD-7	Generalized Anxiety Disorder 7-Item Scale
GHDx	Global Health Data Exchange
HADS	Hospital Anxiety and Depression Scale
HF	Heart Failure
HREC	Human Research Ethics Committee
IADL	Instrumental Activities of Daily Living
IQR	Interquartile range
KASH	King Abdulaziz Specialist Hospital
KCCQ	Kansas City Cardiomyopathy Questionnaire
LVEF	Left Ventricular Ejection Fraction
MARS-5	Medication Adherence Report Scale
Max	Maximum
MCI	Mild Cognitive Impairment
MDI	Major Depression Inventory

Min	Minimum
Mini-Cog	rapid cognitive impairment screening tool
MMSE	Mini-Mental State Examination
MoCA	Montreal Cognitive Assessment
MOS	Medical Outcomes Study social support survey
MSPSS	Multidimensional Scale of Perceived Social Support
N	Number e.g. of sample
NHMRC	National Health & Medical Research Council
NYHA	New York Heart Association
PAD	Peripheral Artery Disease
PHQ	Patient Health Questionnaire
PHQ-9	Patient Health Questionnaire 9-item depression score
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
SCHFI	Self-Care of Heart Failure Index
SD	Standard deviation
SHA	Saudi Heart Association
UK	United Kingdom
US	United States
YLD	Years lost to disability

Abstract

The rising prevalence of heart failure (HF) globally is leading to increased morbidity, mortality, and financial burdens. The limited data on HF in Saudi Arabia challenges effective health strategy planning to improve outcomes and self-care among HF patients. This study aimed to determine self-care practices and identify factors affecting self-care adherence in Saudi Arabia. The research questions are:

- How do HF patients perceive and practice self-care?
- What is the level of self-care adherence among HF patients?
- What factors affect self-care adherence in HF patients?

Methods:

An integrative review identified factors affecting self-care adherence. An exploratory sequential mixed methods study recruited HF patients from outpatient clinics in Saudi Arabia. Fourteen participants completed semi-structured interviews, and 205 completed a survey. Directed qualitative content analysis described HF self-care. Self-care subscales were evaluated using the Arabic version of the heart failure self-care index (A-SCHFI). Explanatory factors were assessed using validated instruments and three multiple regression analyses modelled SCHFI subscales. Qualitative and quantitative data were triangulated and integrated.

Results:

Factors affecting self-care adherence were categorised as personal, disease-related or environmental. Literature review findings revealed inconsistencies in factors between studies, suggesting varying cultural influences. The mean age of participants was 59.9 years, the majority were male (67.5%) and married (74.4%). Participants had a median duration of 5.0 years with HF, and most (87.9%) were classified at NYHA class I and II. Overall self-care scores were suboptimal with median self-care maintenance, self-care management and self-care confidence scores of 43.3, 45.0 and 55.6, respectively. Participants reported engaging in self-care practices such as adhering to their medication regimen, attending appointments, following a low-salt diet and participating in physical

activities, although many acknowledged they struggled to maintain these practices. Standard practices such as checking for ankle swelling, requesting low-salt options when dining out, restricting fluid intake and avoiding sickness were not reported by participants. Nevertheless, participants highlighted other important practices, including seeking information, balancing work and rest, quitting smoking, establishing good sleep routines and managing stress. Predictive factors were identified for self-care maintenance, management and confidence scores.

Conclusion:

Greater attention is needed for HF patients least likely to engage in self-care, such as those who are physically inactive, employed, recently diagnosed, with lower NYHA severity, experiencing more hospital admissions, greater numbers of medications, and uncomfortable discussing their disease with healthcare providers. With a high percentage of variance remaining unexplained for each SCHFI subscale, more research is needed.

Chapter One: Introduction

1.1 The Problem of Heart Failure

Globally, heart failure (HF) is a common and growing problem, affecting around 64.3 million individuals worldwide (8.5 per 1,000 population) according to the Global Health Data Exchange registry (Lippi & Sanchis-Gomar, 2020). Around 920,000 people in the United Kingdom (UK) were diagnosed with HF between 2002 and 2014 (Conrad et al., 2018); around 16,930 patients were diagnosed in Australia between 2013 and 2018 (Parsons et al., 2020), and in the United States (US), about 6.2 million patients were living with HF in 2017 (Virani et al., 2020). Across the board, numbers are increasing and expected to surpass eight million by 2030 (Benjamin et al., 2017). Older people are more often affected, with the incidence of HF in people aged 65 years and over in the US approaching 21 per 1,000 population (Benjamin et al., 2017). In developed countries, the prevalence of HF ranges from 1% to 2% in adults, but rises to $\geq 10\%$ among people aged 70 years or older (Braunwald, 2015; Dickstein et al., 2010). In East Asian countries, the prevalence ranges from 0% to 6% (Reyes et al., 2016). A particular problem for Saudi Arabia is that there is limited information about HF incidence or prevalence. The sole nationally representative study reported the prevalence of cardiovascular diseases was 1.6% ($n = 236,815$) among the Saudi population aged 15 years and older (Alqahtani & Alenazi, 2024). In 2012, an estimated 455,222 patients were being treated for HF in Saudi Arabia, with an incidence of 32,200 patients every year (AbuRuz et al., 2015).

Globally, the increasing prevalence of HF is attributed to the aging of populations and the improved survival rates of patients with myocardial infarction (Metra & Teerlink, 2017; Vigen et al., 2012). Additionally, increasing numbers of people are at risk of HF due to factors such as hypertension, diabetes, obesity, dyslipidaemia and physical inactivity, all of which are associated with the increasing changes in lifestyles, referred to as an epidemiological transition (Mackenbach, 2022). This has been particularly noted in Saudi Arabia (Alhabib et al., 2020). As Saudi Arabia transitions from a stage dominated by infectious diseases to one characterised by chronic, non-communicable conditions, several factors contribute to this shift. Firstly, economic and social changes due to urbanisation play a role as people move from rural to urban living. Advances in medical treatments allow more individuals to survive acute conditions such as cardiovascular events, but they may develop complications later. Improved access to healthcare

services enhances chronic disease management, which helps prolong life but also increases the population at risk for HF. Economic and social changes lead to demographic and lifestyle changes which appear alongside increased life expectancy and rapid population growth. Lifestyle changes, including increased consumption of high-calorie, high-fat, and high-sugar foods, along with sedentary lifestyles due to urbanisation and technological advancements, have led to higher rates of obesity and related conditions like diabetes and hypertension—major risk factors for HF. The shift towards a more sedentary lifestyle, higher consumption of unhealthy foods, and a growing aging population have all contributed to the increasing incidence of cardiovascular diseases, including HF (Aljefree & Ahmed, 2015).

Despite substantial advances in treatments, HF remains a serious public health issue, posing a significant global morbidity and mortality burden on individuals and society (Metra & Teerlink, 2017). Years lost to disability (YLD) is an indicator of the burden of living with a particular disease or disability (Luyckx et al., 2018); around the world the equivalent of 9.91 million years (11.61 YLDs per 1,000 population) were lost due to premature death or disability caused by HF (Lippi & Sanchis-Gomar, 2020). The mortality rate within the first year of diagnosis among patients with HF is high, ranging from 34% in Africa, 23% in India, 15% in Southeast Asia, 9% in both South America and the Middle East, and 7% in China (Dokainish et al., 2017). The prognosis for patients with chronic HF is poor and more than half (59.7%) die within five years of diagnosis (Jones et al., 2019; Mozaffarian et al., 2015).

HF also poses economic burdens. In 2012, HF was responsible for about \$108 billion per annum globally of overall healthcare spending; direct costs accounted for \$65 billion, while indirect costs accounted for \$43 billion (Cook et al., 2014). Financial costs are particularly high due to frequent hospital admissions, which account for more than half the annual costs (Shafie et al., 2018). The median annual total healthcare expenditure on hospitalisation for HF care in the US alone was estimated at \$24,383 per patient in 2014–2020 (Urbich et al., 2020). Almost half of the patients' hospital readmissions were for cardiovascular causes; around one-third of these patients were readmitted primarily due to HF and one fifth (20.2%) of these readmissions occurred within 30 days of discharge, with a reported median time to readmission of 12 days (Patil et al., 2019; Reddy & Borlaug, 2019). Among Saudis, the cost to both the healthcare system and the family in relation to HF is high during hospitalisation, which often includes Intensive Care Unit transfers, long stays in hospital, hospital-acquired infections and increased mortality rates.

One study found that the mean \pm SD total cost of hospitalisation and treatment procedures, invasive and non-invasive, for patients with HF from time of diagnosis to death or recovery for Saudi patients was US\$ 37,355, \pm 49,336 (Salem & ElKhateeb, 2017). Another study investigated the estimated healthcare expenditures associated with HF in Saudi Arabia from a social perspective, conducting a multicentre cost of illness study to estimate the direct medical cost associated with HF. This study revealed a direct medical cost per HF patient of \$9563; this expenditure mostly entailed hospitalisation costs followed by medication and diagnostics costs. Costs ranged from \$3671 for HF patients at NYHA class I to \$16,447 for HF patients at NYHA class IV (Alghamdi et al., 2021).

In summary, the prevalence of HF is rising globally, with increasing burdens on international populations in terms of morbidity, mortality and financial costs. However, the limited data available on the scope and scale of the problem in Saudi Arabia presents significant challenges to planning and implementing effective health strategies to enhance health outcomes and self-care for Saudi people living with HF.

1.1.1 Heart Failure Pathophysiology

HF is the end stage of various cardiac diseases (Adebayo et al., 2017). It is

a clinical syndrome characterized by typical symptoms (e.g., breathlessness, ankle swelling and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles and peripheral oedema) caused by a structural and/or functional cardiac abnormality resulting in reduced cardiac output and/or elevated intracardiac pressures at rest or during stress. (Ponikowski et al., 2016, p. 2136)

The aetiology of HF varies between high-income and developing countries, and patients may have mixed aetiologies. The most common causes of HF in high-income regions are ischaemic heart disease and chronic obstructive pulmonary disease, while in low-income regions, hypertension, rheumatic heart disease, cardiomyopathy and myocarditis are more common (Yusuf et al., 2014). It can be classified in many ways: as acute or chronic HF based on the time course of symptom development; as left ventricular, right ventricular or biventricular HF based on the deficit location (Tripoliti et al., 2016); as HF with reduced ejection fraction (EF), HF with preserved EF and HF with mid-range EF, based on the functional status of the heart as indicated by the left ventricle ejection fraction (LVEF) (Ponikowski et al., 2016). The most commonly used classification system, the New York Heart Association (NYHA) functional classification, defines four functional classes as:

- *Class I (Mild)*: HF does not cause limitations to physical activities; ordinary physical activity does not cause undue fatigue, palpitation, dyspnoea, or chest pain.
- *Class II (Mild)*: HF causes slight limitations to physical activities; the patients are comfortable at rest, but ordinary physical activity results in fatigue, palpitation, dyspnoea, or chest pain.
- *Class III (Moderate)*: HF causes marked limitations of physical activity limitations; the patients are comfortable at rest, but less than ordinary activity causes fatigue, palpitation, dyspnoea, or chest pain.
- *Class IV (Severe)*: HF patients are unable to carry on any physical activities without discomfort, HF symptoms or symptoms experienced even at rest (Skopicki et al., 2023).

1.2 Treating and Managing Heart Failure

Optimum treatment of HF involves long-term complex pharmacotherapy and patient education on lifestyle change (Sapna et al., 2023). Lifestyle modification includes weight management, restricting salt and fluid intake, balancing physical activity with rest, consuming a heart-healthy diet, daily weighing, symptom recognition, and seeking assistance when necessary (Aggarwal et al., 2018). In addition, patients and their families should be actively engaged in their plan of care and participate in decision-making for their treatment regimen (Real et al., 2018; Shively et al., 2013). In combination, these efforts aim to alleviate symptoms, improve quality of life, reduce readmission rates, improve disease prognosis and prolong survival (Ponikowski et al., 2016). A recent Cochrane review highlights that disease management programs promise not only to improve HF outcomes by reducing all-cause mortality and hospital readmissions rates, but also to make living with HF more manageable. Case management and multidisciplinary interventions were found to reduce mortality and the risk of readmissions, whereas clinic-based interventions, usually delivered by cardiologists or specialist nurses using agreed protocols (covering medication review and management, exercise promotion and dietary advice), showed little or no effect on HF outcomes (Takeda et al., 2019).

1.2.1 Nurse-Led Management of Patients with Heart Failure

Nurse-led HF management is now well established in many countries. Following their discharge from hospital with a diagnosis of heart failure, patients are expected to maintain the

self-care skills and knowledge acquired during their stay in the hospital. Although self-care can be considered a patient's responsibility, nurses support them to learn how to monitor and interpret their symptoms, set priorities and make decisions about their care (Riegel & Dickson, 2008) through enrolment in a nurse-led or a multidisciplinary HF management program. Such programs aim to maintain hospital-initiated self-care education with home visits by nurses or practitioners, which can be enhanced by telemonitoring and telephone support, providing a rapid medical review for HF patients and titrating their complex medications as needed (Atherton et al., 2018). Nurse-delivered interventions can assist patients through health education by directing access to expert information, promoting health literacy and empowering patients to improve health outcomes (Rasmusson et al., 2015). Nurses are able to build trust and supportive relationships with patients and their families by effective communication; they are well-placed to spend time with patients, making them well-positioned to be primary educators of patients with chronic illness (Albert et al., 2015). This enables them to promote adherence to self-care behaviours through identifying needs and any omissions in the discharge plan (Albert et al., 2015). A recent systematic review showed the positive effects of nurse-led HF self-care education in reducing HF patients' all-cause hospital admissions, HF-specific hospital admissions, and all-cause mortality or hospital admission by 25.2%, 40.0%, and 29.4%, respectively (Son et al., 2020).

Nurse-led HF self-care education is delivered through pre-discharge interventions, which include HF knowledge and lifestyle assessments, physical examinations, psychosocial support and support for managing comorbidities. It entails providing education on long-term HF management, such as sodium restriction, weight management, symptom monitoring, adherence to medical treatments, and enhancing physical activity and exercise. Additional specialists can be engaged, such as pharmacists to improve medication adherence and dietitians for nutritional counselling (Son et al., 2020). Nurse-led HF management presents opportunities for future service development to improve outcomes for patients with HF living in Saudi Arabia. However, this potential is hindered by limited understanding of how people in the country self-manage their HF and the factors influencing the effectiveness of their self-care.

1.3 Self-Care in Patients with Heart Failure

Self-care is defined as “the ability of individuals, families and communities to promote and maintain their own health, prevent disease, and to cope with illness—with or without the

support of a health or care worker”(WHO, 2014, p. 1). Self-care is performed by both well and ill people (Orem, 2003). According to the Situation-Specific Theory of Heart Failure, self-care is a naturalistic decision-making process that guides patients’ daily activities (Riegel & Dickson, 2008).

In patients with HF, self-care activities include, firstly, the process of maintaining physiological stability, monitoring symptoms and adherence to treatment: *self-care maintenance*. Specifically, self-care maintenance refers to behaviours that help maintain the physical and mental stability of the person through engagement in healthy activities, such as treatment adherence, exercise, eating healthy food and symptom monitoring, including checking for weight change and ankle swelling. Secondly, self-care activities include the process of responding to symptoms when they occur: *self-care management*. Self-care management includes actions that occur in response to perceptions of signs or symptoms and consist of recognising symptom changes (e.g. increased ankle oedema or shortness of breath), evaluating symptom changes, implementing treatment (e.g., using extra diuretics, refraining from eating salty foods), and then evaluating treatment (Riegel & Dickson, 2008). Furthermore, individuals’ perceived ability to perform self-care maintenance and management behaviours, referred to as self-care confidence, appears to impact the adoption of these behaviours and positively affect self-care outcomes (Riegel et al., 2016).

In managing HF, patients must implement effective strategies to maintain health and manage health issues. These commonly include a complex regimen of self-care behaviours, such as medication adherence, symptom monitoring, weight and sodium control, following a balanced diet and taking regular exercise. Self-care plays a key part in the non-pharmacological management of patients with chronic health conditions including HF (Strachan et al., 2014). Patients with HF are encouraged to engage in self-managing their disease by following their medical regimens and monitoring symptoms in order to improve health outcomes and quality of life (Clark et al., 2015; Kessing et al., 2017; Toukhsati et al., 2019), and reduce rehospitalisation (Boyde et al., 2018; Toukhsati et al., 2019) and mortality rates (Ruppar et al., 2016; Toukhsati et al., 2019). Ultimately, adherence to self-care activities also reduces healthcare expenditure (Fergenbaum et al., 2015).

Recent studies have focused on identifying factors that affect self-care behaviours and using this information to develop interventions to improve self-care in HF patients and their families

(Kleman et al., 2024; Sedlar et al., 2021). However, although practising self-care results in positive health outcomes (Sezgin et al., 2017), HF patients often find it challenging to follow a self-care program. The reasons underpinning this can be multiple and include age-related changes, such as: limitations in physical and cognitive abilities (Abete et al., 2013); the burden of maintaining long-term lifestyle changes, managing comorbid conditions and polypharmacy; and situational factors such as lack of motivation and inadequate social and family support (Attaallah et al., 2016; Jaarsma et al., 2017).

Although managing heart failure involves universal physiological needs—such as controlling fluid retention, maintaining blood pressure, and improving cardiac function—self-care practices also depend heavily on cultural, social, and behavioural factors. These factors vary significantly across settings and cultures, shaping how patients understand and engage in self-care to achieve similar physiological goals. For instance, while clinical practice guidelines for Western settings emphasize patient autonomy and personal responsibility for self-care (such as independently monitoring weight and adjusting diet or fluid intake), in Arab cultures including Saudi Arabia, self-care is often a family-centred activity. Family members may be actively involved in medication adherence, dietary decisions, and even monitoring symptoms (Almalki et al., 2011; WHO, 2014). As an example, Western patients might be encouraged to attend structured cardiac rehabilitation programs that focus on individualized exercise plans, dietary changes, and self-monitoring. By contrast, for patients in Saudi Arabia, these programs may need to include family education sessions and adapt dietary advice to local foods and shared family meals, as dietary practices are closely tied to social norms (Aljefree & Ahmed, 2015; Khatib et al., 2014). This highlights that while the ultimate goal—physiological stability and improved quality of life—remains consistent, the methods for achieving it must respect and incorporate the cultural and social context in which patients live.

1.3.1 Theoretical Frameworks

Identifying and supporting patients who are at risk for inadequate self-care must be a priority for healthcare providers in planning effective interventions. In the field of self-care for heart failure, researchers and clinicians need to identify the factors that influence the engagement of patients with HF in self-care to understand the complex process of self-care and to develop appropriate, theory-based interventions to promote patients' self-care practice. Nurses provide education to enhance and support patients and their caregivers to maintain their health and

manage their HF. To facilitate this, they may use a variety of generic and heart-failure specific theoretical frameworks (Riegel et al., 2012). For example, Orem's self-care theory defines self-care as the practice of activities initiated and performed with regularity by individuals to maintain life, health and well-being (Orem, 2003). Orem developed a generic theory of self-care that has been widely used to underpin many models of management of chronic disease. This theory suggests that the desire and demand to intentionally learn to perform self-care consistently and in a sustained manner arises in coexistence with health problems, often referred to as health-deviation self-care requisites. According to this theory, participation in self-care may be influenced by internal or external factors and is shaped by basic conditioning factors based on individuals' needs and health status. Basic conditioning factors include age, gender, health status, social and cultural orientation, family system factors, lifestyles, and the availability and adequacy of resources. Although this theory has suggested specific activities that help manage chronic health conditions such as cancer and chronic pain, Orem's self-care theory is not specific to the self-care of patients with HF or even chronic disease (Orem, 2003). As such, it may miss specific considerations.

The middle-range theory of self-care of chronic illness was specifically developed for chronic disease. It defines self-care as "a process of maintaining health through health-promoting practices and managing illness" (Riegel et al., 2012, p. 195). It focuses primarily on individuals and acknowledges the role of healthcare professionals in promoting self-care. Similar to Orem's self-care theory, this theory is not limited to any specific disease and can be applied across various chronic diseases. According to this theory, the self-care process often requires decision-making, which makes the process complicated. Patients rarely use a cognitive, rational decision-making process or generate and compare action options in a systematic fashion to manage their symptoms. Thus, in real-world situations, naturalistic decision-making is commonly used in the process of self-care. One element of this theory is reflection, which can be associated with the acquisition of additional knowledge for decision-making in self-care. However, patients with low knowledge level or who misunderstand the rationale for self-care are unlikely to undertake self-care of any quality, and those who perform self-care activities may do so in a non-reflective and unremarkable manner. For example, many patients take their medication without knowing the purpose for which it was prescribed and may not gain knowledge if they perform this self-care activity in an unreflective manner. Other patients monitor their weights regularly, but do not

know what to do with the information they collect. The theory assumes that patients with insufficient knowledge or misperceptions can participate in and benefit from targeted education aimed at enhancing self-care abilities (Riegel et al., 2012).

Key concepts in this theory include *self-care maintenance*, *self-care monitoring*, and *self-care management* (Riegel et al., 2012). Self-care maintenance is defined as those behaviours that patients with chronic disease engage in to maintain physical and emotional stability. These behaviours may be completely self-identified and include engaging in behaviours for inherent pleasure and satisfaction when a patient experiences clear benefits (*intrinsic motivations*) or may reflect recommendations agreed upon between patients and healthcare professionals (*extrinsic motivations*) (Jaarsma et al., 2017). Self-care monitoring refers to the process of monitoring oneself for changes in signs and symptoms; for example, patients with HF monitor their weight regularly to identify fluid gains and losses to detect HF deterioration. Self-care management is defined as responses to signs and symptoms when they occur; for example, shortness of breath due to HF may require taking an extra diuretic. Self-care management requires attention to the efficacy of treatment to assess whether the actions taken should be tried again in the future. Engaging in self-care behaviours is believed to reflect natural decision-making with a component of situational awareness, with mental simulation of a reasonable course of action, and then the evaluation of the outcome of that action (Riegel et al., 2013). Situational awareness enhances treatment evaluation by making it easier to perceive events, understand their meaning and present their future condition (Riegel & Dickson, 2008).

The middle-range theory of self-care of chronic illness considers self-care as essential in the management of chronic disease, but it does not specify the elements of self-care so that it can be used across a variety of chronic conditions. The majority of patients seek care because they want to relieve or treat disease symptoms. When healthcare professionals interact with patients, their goal is partnership and to motivate patients to engage in self-care that can be integrated into their lifestyle. In this context of a mutually rewarding relationship, effective self-care for chronic disease can occur (Riegel et al., 2012). This theory has been widely utilised and can be considered a valuable tool for understanding self-care in chronic health conditions (Riegel et al., 2012). It is not specific to self-care in HF but nonetheless, the concepts developed within this theory were later applied to develop the Situation-Specific Theory of Heart Failure Self-Care, which is tailored specifically to HF management.

This theory has been proven to be beneficial in understanding HF across various contexts (Riegel et al., 2022). According to this theory, self-care is a naturalistic decision-making process that guides patients' daily activities (Riegel & Dickson, 2008). In patients with HF, self-care activities include, firstly, the process of maintaining physiological stability, monitoring symptoms and adherence to treatment (*self-care maintenance*), and secondly, the process of responding to symptoms when they occur (*self-care management*) (Riegel & Dickson, 2008). Specifically, self-care maintenance refers to behaviours that help maintain the physical and mental stability of the person through activities such as treatment adherence, exercise, consuming healthy food and monitoring symptoms, such as checking for weight change and ankle swelling. Self-care management includes actions that are taken in response to perceptions of symptoms and consists of recognising symptom changes (e.g., increased ankle oedema or shortness of breath), evaluating symptom changes, implementing treatment (e.g., using extra diuretics or reducing the salt content of meals), and then re-evaluating the effects of these treatments.

Furthermore, according to the middle-range theory of self-care of chronic illness, individuals' perceived ability to perform self-care maintenance and management behaviours, referred to as self-care confidence, appears to impact the adoption of these behaviours to positively affect self-care outcomes (Riegel et al., 2016). In other words, self-care confidence influences the relationship between self-care behaviours and self-care outcomes.

According to Riegel et al., self-care involves making decisions to adequately interpret the self-care process (Riegel & Dickson, 2008). In the revised version of the theory, Riegel et al. (2016) introduced a new element between self-care maintenance and self-care management, known as *symptom perception*. Thereafter, self-care was defined as a naturalistic decision-making process encompassing behaviours aimed at maintaining physical stability, interpreting the perception of symptoms, and subsequently managing these symptoms. The theory characterises these naturalistic decisions as influenced by the interaction among personal, problem and environmental factors regarding self-care behaviours (Riegel et al., 2016). 'Personal factors' denote the characteristics of a person diagnosed with HF (e.g., age). 'Problem factors' refer to the physical and emotional characteristics associated with HF diagnosis (e.g., multiple comorbidities). 'Environmental factors' refer to the surrounding characteristics of a person diagnosed with HF (e.g., social support) (see Table 1).

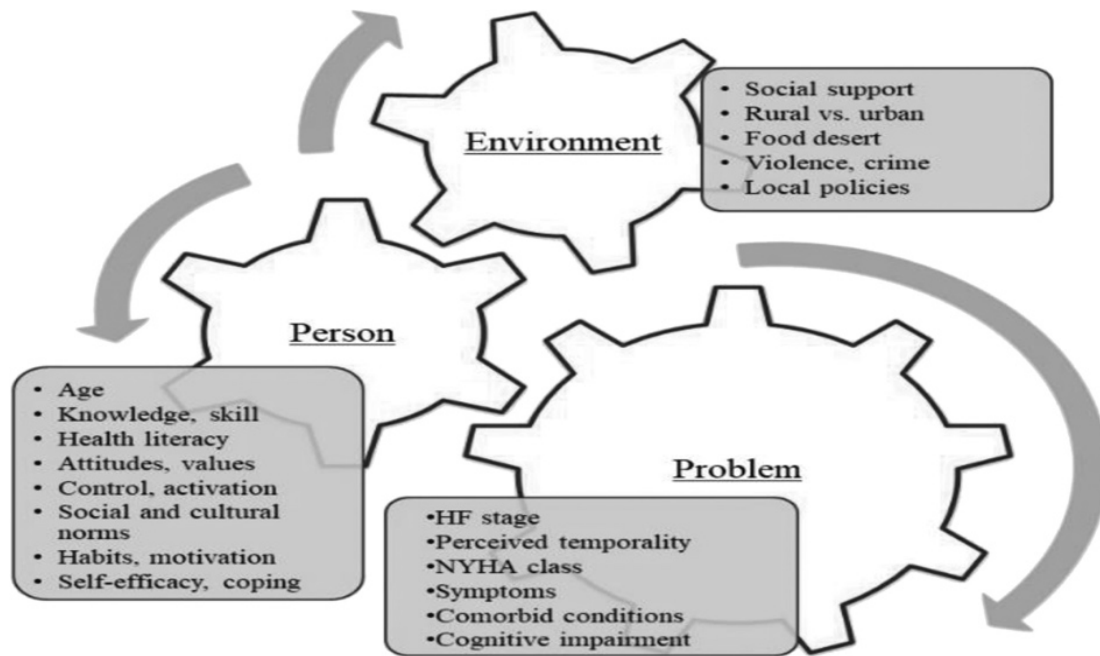
Table 1: Examples of Person, Problem and Environment Characteristics in the Context of Heart Failure Self-Care (Riegel et al., 2022)

Personal	Problem	Environmental
Age Gender Knowledge, skills & health literacy Experiential attitude & values Perceived control & self-efficacy Social norm & cultural beliefs Habits & motivations & coping	Cognitive impairments Comorbid conditions HF severity	Physical influences: seasonal variations Chemical factors Biological factors (e.g., food. Social or cultural hazards (e.g., violence) Social support & presence of caregivers Concordance of patient and provider Stressful events Access to resources (e.g., health insurance, internet, public policy)

Note. Adapted from "The Situation-Specific Theory of Heart Failure Self-care an Update on the Problem, Person, and Environmental Factors Influencing Heart Failure Self-care" by B. Riegel, 2022, *The Journal of Cardiovascular Nursing*, 37(6), 515-529, 11/12 2022. | DOI: 10.1097/JCN.0000000000000919

The core principle of the Situation-Specific Theory of Heart Failure Self-Care is rooted in the concept of naturalistic decision-making. This theory suggests that individuals base their decisions in real-world situations on a combination of their past experiences and the information available to them in the present moment (Riegel et al., 2016). In addition to familiarity with the relevant situation, naturalistic decision-making is typically influenced by individuals' knowledge, skills and values (Riegel et al., 2016). As a result, the interplay among the problem, the person, and the environment forms a situation that reflects the naturalistic decision-making process, leading to the formulation of a self-care decision (Riegel et al., 2022) (see Figure 1).

Figure 1: The Situation-Specific Theory of Heart Failure Self-Care: The Interaction Between Person, Problem and Environment Characteristics



Note. Adapted from "The Situation-Specific Theory of Heart Failure Self-care An Update on the Problem, Person, and Environmental Factors Influencing Heart Failure Self-care" by B. Riegel, 2022, *The Journal of Cardiovascular Nursing*, 37(6), 515-529, 11/12 2022. | DOI: 10.1097/JCN.0000000000000919

The Situation-Specific Theory of Heart Failure Self-Care was selected as the theoretical framework for this study due to its specific focus on HF and its core components of self-care: maintenance, management, and confidence. It emphasizes reflective and interactive decision-making processes shaped by situational factors. Widely applied in HF research, the theory supported the identification of key variables, interpretation of interview data, and guided both the qualitative and quantitative phases of the study (Riegel et al., 2016).

This theory sees the adoption of cultural norms as a personal factor rather than an environmental factor. This is possibly because the Situation-Specific Theory of Heart Failure Self-Care originates from the United States, a highly ethnically heterogeneous country where individuals may live in very diverse communities. In such societies, adoption of cultural norms may be a personal rather than social, community or environmental matter, with much less social pressure to conform to any one specific set of cultural factors. However, this may not apply in the same manner to residents of other countries, for example, in Saudi Arabia, where the culture

of the community is much more homogenous (Long, 2005). In such societies, the cultural aspects of individuals' self-care practices may function as social and environmental rather than personal influences. By identifying cultural influence as a personal (not environmental) factor, this theory views this component of self-care as an individual's responsibility. However, the situation may differ in Saudi Arabia, where migrants, primarily economic, constitute only 10% of the population and reside in separate compounds (Long, 2005). Self-care for heart failure in Saudi Arabia may be significantly influenced by the broader context in which patients live, which may differ from the settings where the theory was originally developed and applied. In a culturally homogeneous society such as Saudi Arabia, the role of culture in shaping the self-care practice of patients with HF may be considerable and warrants careful investigation. Nevertheless, this theory has been extensively utilised and has demonstrated appropriateness across various cultural groups other than where it was developed, as evidenced by previous studies, for example from Italy (Vellone et al., 2020), Sweden (Jaarsma et al., 2013), Australia (Cameron et al., 2010) and Japan (Kato et al., 2009).

1.4 The Study Setting of Saudi Arabia

1.4.1 Heart Failure in Saudi Arabia

Saudi Arabia has an estimated 35 million population, with a growth rate of 2.9% and 1.9% per year reported in 2015 and 2020, respectively (United Nations, 2020). More than 25% are under the age of 14 years and only 5.2% are above 60 years (United Nations, 2020). Males and females are approximately equal in number, with a life expectancy of 76.0 years in females compared to 73.1 years in males (United Nations, 2020). A study of n=685 patients with HF referred to tertiary care HF clinics in Saudi Arabia and enrolled in the Heart Function Assessment Registry of Saudi Arabia between 2009 and 2011 showed that patients with HF had a mean age at diagnosis of 55.6 (SD= 15.97) years, which is younger than data from other countries show, such as from the US at 59.0 years (Ditah et al., 2019), and the UK at 76.7 years (Conrad et al., 2018). Commonly recorded cardiovascular risk factors included hypertension (occurring in 68.8% of patients), diabetes mellitus (in 51.4%), and current or previous tobacco smoking (in 34%). The overall one-year mortality rate in this population was 9% (of which 93.7% was cardiac-related); the one-year hospital readmission rate was 39%, and 50% experienced emergency room presentations (Alhabeeb et al., 2017).

Self-care programs for patients with HF support patients to adopt healthy lifestyle changes into their daily routines, such as increasing physical activity and improving eating habits. However, a recent study conducted in Saudi Arabia by Soofi et al. (2020) showed that the majority of Saudi patients with HF had inadequate knowledge of heart failure; 50% of the study population was unaware of the importance of daily weight checks and regular exercise; about 20% did not follow salt and fluid restriction in their daily routine; and many experienced psychosocial distress and did not attend to self-care behaviours.

One of the key features of successful self-management programs is that they are suited to the cultural and social environment in which they operate (Jaarsma et al., 2017). Saudi patients with HF have unique characteristics that may translate into different determinants and needs of self-care compared to those of the cultures in which most self-care programs have been tested, e.g., developed Western countries (AlHabeeb et al., 2019). Such differences may arise from the particular cultural perspectives, based on the religion (Islam), the tribal system, specific characteristics of the Arabic culture and the economic situation.

1.4.2 The Religion, Culture, Economic and Healthcare Systems in Saudi Arabia

As Saudi Arabia is the home of the Two Holy Mosques of the Muslims, it enjoys a unique position in the Islamic world. Islam is described as the first principle in Saudi culture because it defines the society's customs, traditions, duties and social practices through the Holy Qur'an and the Prophet's Sunnah (sayings of the Prophet Muhammad, may God bless him and grant him peace). The Qur'an has been a unifying force of great influence, acting as an engine to create a common culture and legal system across the Muslim world. Equality is ensured to everyone regardless of their health, wealth or other criteria, because the Muslim community is seen as a brotherhood. The common statement is that morality comes from religion and is characterised by a collective community with strong family and community ties, committed to the Islamic religion (Mutair et al., 2014). Restraint in disclosing personal matters, including matters related to health, is important, and Arabic patients may prefer not to express physical and mental complaints that affect their health (Sabry & Vohra, 2013). They may rely on their faith to alleviate their discomfort (Sabry & Vohra, 2013).

Arab culture is a second key feature of Saudi lifestyles, because it sets the agenda for the social life of the people and emphasises the importance of the homeland and the traditional

personality. Arabic cultural features originated from a common linguistic, historical and spiritual background that can significantly impact health. The focus on self-care in Western societies comes from a cultural perspective that reflects notions of independence and self-responsibility. In contrast, in Arab cultures including Saudi Arabia, the focus is on family or group bonding; in other words, self-interest comes after family interests. This is consistent with the WHO's definition of self-care, which includes families and communities in promoting health, preventing disease, maintaining health, and supporting disease and disability (WHO, 2014) . Systems of kinship and tribalism also influence an individual's position in society and can affect their success or failure, whether in traditional or new fields of activity (Muharrem et al., 2017).

The discovery of oil and other natural resources, such as gas, in the Gulf Cooperation Council countries—including Saudi Arabia—has also had a major impact. It has spurred rapid economic development and growth. However, this economic boom has been accompanied by changes in lifestyle, including increased consumption of processed and low-quality foods and a shift towards more sedentary behaviours. As a result, rates of cardiovascular disease and related risk factors among Gulf residents now surpass those in many developed countries (Aljefree & Ahmed, 2015). On the positive side, economic growth has allowed the development of a national health system in Saudi Arabia. The National Health Insurance System provides free services to all Saudi citizens and some residents (Almalki et al., 2011). Yet, the healthcare system now faces new challenges, such as declining oil revenues, a growing population, the emergence of lifestyle-related diseases, and rising expectations for better quality care (Rahman & Alsharqi, 2019). Altogether, these cultural and economic factors highlight that findings from research conducted in Western cultures may not fully apply to individuals in Saudi Arabia.

The burden of heart failure (HF) among patients in Saudi Arabia places a significant strain on the healthcare system, driven largely by the rapidly rising prevalence of cardiovascular risk factors such as diabetes, hypertension, and obesity. While these conditions are also common in Western countries, the pace of increase in Saudi Arabia is particularly alarming. For instance, the prevalence of obesity in Saudi adults has exceeded 35%, and type 2 diabetes affects nearly one in five adults—rates that have risen more sharply than in many high-income Western nations over the past two decades (Al-Omar et al., 2024; Aldubikhi, 2023). These chronic conditions contribute directly to the growing incidence of HF, increasing the demand for continuous, resource-intensive care that includes diagnosis, treatment, and long-term monitoring.

In this context, promoting self-care practices among HF patients becomes essential. Evidence-based self-care involves consistent medication adherence, dietary modifications, physical activity, and symptom monitoring, all of which require sustained behaviour change. However, such behaviours are shaped by cultural, social, and religious norms, meaning that strategies developed in Western countries may not be fully applicable in the Saudi context without appropriate cultural adaptation (Aljefree & Ahmed, 2015). For example, dietary recommendations or attitudes toward physical activity must take into account local customs, gender roles, and religious practices.

Crucially, the way such recommendations are operationalised and communicated must also be culturally appropriate and acceptable to the target patient group if there is to be any realistic expectation of adherence. Acceptance and adoption of behaviour change recommendations are necessary to empower patients to manage their condition effectively, which in turn can reduce mortality and readmission rates, improve quality of life, and alleviate pressure on the healthcare system. Ultimately, these efforts support a more efficient and sustainable healthcare model, helping to slow the progression of HF and enhance the overall capacity of the system (Clark et al., 2015; Kessing et al., 2017).

Prior to this study, no research into HF in Saudi Arabia had been conducted within a theoretical framework to determine the factors influencing self-care in patients with HF. Moreover, few such studies have been conducted across the Middle East. One study in Jordan reported low-level self-care scores in HF patients, as measured by the self-care of heart failure index (SCHFI), with mean (SD) scores of 53.89 (29.77), 57.56 (29.16) and 45.07 (35.67) for self-care maintenance, self-care management and self-care confidence, respectively (Tawalbeh et al., 2017). Similarly, a study from Iran found even lower SCHFI scores in HF patients, with mean (SD) of 33.8 (10.7), 32.2 (12), and 43.6 (15.6) for self-care maintenance, self-care management and self-care confidence, respectively (Siabani et al., 2016). These scores are noticeably lower than those reported in Western countries. For instance, in Australia, where mean (SD) scores were reported of 67.8 (17.3), 50.04 (16.64) and 62.00 (19.98) for self-care maintenance, self-care management and self-care confidence, respectively (Cameron et al., 2009). Similarly, studies from the US reported mean scores ranging from 59.68 (16.22) to 63.57 (19.12), from 51.19 (18.98) to 68.25 (20.24) and from 62.64 (18.16) to 64.99 (16.06) for self-care maintenance, self-care management and self-care confidence, respectively (Davis et al., 2015; Graven et al., 2019;

Vaughan et al., 2013). The cultural, social and healthcare system differences in the Middle East region may explain some of the variations in these findings and highlight important indicators for improving self-care in this population.

These studies indicate that self-care scores from Middle Eastern populations may vary substantially compared to those from Western populations. These findings and the paucity of Middle Eastern studies reveal a significant gap in current knowledge. It is therefore important that studies are conducted to explore self-care among patients with HF in Saudi Arabia and to assess the determinants of self-care within this cultural context. The results will be valuable for policymakers and stakeholders in the Saudi healthcare system to guide efforts in enhancing healthcare services for patients with HF.

1.5 Aims, Research Questions and Objectives for the Study

In response to the rising prevalence of heart failure and the challenges this presents for patients, their families, communities and the health system of Saudi Arabia, this study aimed to determine the level of self-care practice and identify factors that affect the ability of patients with heart failure to adhere to self-care recommendations within the Middle Eastern culture of Saudi Arabia. To achieve this, the study was planned in two phases. Phase One comprised semi-structured interviews conducted with a small number of patients living with heart failure in Saudi Arabia. This phase was intended to yield deep and rich qualitative data to provide insights into the experiences of these patients living with and managing their heart failure in the Middle Eastern context of Saudi Arabia. Phase Two was planned to use a number of validated survey tools to collect adequate quantitative data to determine rates of self-care adherence and factors of significance for this in this same population. Overall, research questions addressed were:

1. How do patients living with heart failure in Saudi Arabia perceive and practise self-care in relation to their disease?
2. What is the level of self-care adherence in heart failure patients in Saudi Arabia?
3. What factors determine, predict, facilitate or present barriers to self-care adherence in patients living with heart failure in Saudi Arabia?
 - a) What are the personal factors that determine, predict, facilitate or present barriers to self-care adherence in heart failure patients?

- b) What are the problems or disease factors that determine, predict, facilitate or present barriers to self-care adherence in heart failure patients?
- c) What are the environmental factors that determine, predict, facilitate or present barriers to self-care adherence in heart failure patients?
- d) What, if any, other factors determine, predict, facilitate or present barriers to self-care adherence in heart failure patients?

This study was conducted in two phases.

Phase One objectives were:

- To conduct semi-structured interviews to explore the self-care experiences of patients living with heart failure in Saudi Arabia in relation to their disease and to use these data -
 - To determine those factors which affect the self-care practices of patients with HF in Saudi Arabia and
 - To identify the main barriers and facilitators of self-care practices of patients with HF in Saudi Arabia.
- To use interview data to inform the choice of a survey, to be conducted in the next phase.

Phase Two objectives were:

- To deliver a survey to quantify the adherence to self-care practices of patients living with heart failure in Saudi Arabia and to identify factors that influence this:
 - To determine the level of the self-care of heart failure index (SCHFI) for comprehensive assessment of patients with HF living in Saudi Arabia by comparing SCHFI component variables to those identified in Phase One as locally important determinants of self-care.
 - To survey patients living with heart failure in Saudi Arabia to assess their level of adherence to best-practice self-care, and to identify those personal, disease-related, environmental and other factors that significantly influence self-care for these patients.

1.6 Overview of the Thesis

The first chapter of this thesis introduces heart failure, highlighting its significance, treatment and management, including nurse-led management and the importance of self-care for patients with HF. It discusses the context of Saudi Arabia, emphasising the importance of this problem within Saudi Arabia and the unique factors that may influence HF management in this setting. The chapter outlines the study's aims and research questions, demonstrating its significance.

The second chapter presents a literature review that synthesises the current state of knowledge on this topic. It defines the review's aim, the rationale for the chosen design, literature search methods data extraction, data analysis, and the results. This review of the literature establishes an evidence-based foundation that underpins the study aims and questions.

The third chapter details the theoretical and methodological framework of the research, including its research aims and questions. It justifies the selection of a mixed-methods research design, wherein the first component (Phase One) utilised qualitative methods to gather narrative accounts from participants regarding their experiences with HF self-care. The second component (Phase Two) involved collecting quantitative data through surveys to examine, confirm and quantify the interview findings. This chapter also elaborates on participant selection and recruitment, data collection methods, data management and analysis, ethical considerations and project management.

The fourth chapter reports the qualitative findings from Phase One of the study. Findings were derived from directed qualitative content analysis of interview transcripts of face-to-face interviews with fourteen patients living with HF in Saudi Arabia. The analysis identified key categories that influence Saudi patients' self-care practices. These findings were used to assess the applicability of the Situation-Specific Theory of Heart Failure Self-Care to the self-care of Saudi patients.

The fifth chapter discusses the quantitative findings from Phase Two of the study. This section is grounded in statistical analysis that provides insights into patients' perceptions of self-care practices and the factors influencing their self-care in Saudi Arabia. A questionnaire was designed to address the study's research questions, detailing the personal, problem-related and environmental characteristics of 205 participants living with HF in Saudi Arabia. Factors

significantly predictive of HF self-care outcomes were modelled through multiple regression analysis.

The sixth chapter reports the discussion of findings, triangulating and integrating results from both qualitative and quantitative studies. Following this, the study's strengths and limitations are presented and discussed.

The seventh chapter reports study conclusions, implications and recommendations for future practice, policy development, education and research.

1.7 Significance of the Research

Considering the rising prevalence of chronic diseases, particularly HF, which tends to develop at relatively younger ages in Saudi Arabia, identifying and supporting patients at risk of inadequate self-care should be a priority for healthcare providers. Until 2019, Saudi Arabia lacked standardised protocols for managing HF on a national level. The recent guidelines from the Saudi Heart Association (SHA) in 2019 were established to address this gap in healthcare practices. These guidelines provide a structured and unified approach to the management of HF across the country (AlHabeeb et al., 2019). However, these guidelines are mainly based on studies conducted with non-Saudi HF populations. Therefore, when treating HF patients and improving their self-care behaviours, healthcare providers in Saudi Arabia primarily rely on knowledge of HF self-care determinants derived from international studies (AlHabeeb et al., 2019).

This presents a significant challenge to providing services optimally tailored to support patients embrace and maintain evidence-based self-care behaviours in their everyday lives. Successful chronic disease management, particularly in HF depends greatly on the effective implementation of behaviour change strategies. The Consolidated Framework for Implementation Research (CFIR) offers a valuable lens for examining how both individual-level and contextual elements—such as cultural norms—affect the adoption of health behaviours (Damschroder et al., 2009). Likewise, the Social Ecological Model highlights the interconnected influences of personal, interpersonal, community, and societal factors on health behaviour, reinforcing the importance of culturally adapted, context-specific interventions (Kincaid et al., 2009).

In Saudi Arabia, cultural characteristics—such as strong family ties, gender-specific roles, religious obligations, and traditional health beliefs—significantly shape patients' perceptions of illness and their engagement with self-care. For instance, standard dietary and physical activity guidelines may not align with customary eating habits or the availability of gender-appropriate spaces for exercise. Consequently, interventions grounded in Western research may fail to resonate with Saudi patients unless they are thoughtfully adapted to local cultural realities.

To improve the likelihood of success of HF management strategies in Saudi Arabia, it is essential to investigate the specific cultural and contextual factors that influence self-care behaviours. Gaining this insight will help tailor interventions that are not only evidence-based but also culturally relevant and acceptable to the target population. Ultimately, this approach can enhance patient adherence, reduce hospitalisations, improve clinical outcomes, and ensure more efficient use of healthcare resources within the Saudi health system.

The specific determinants of self-care adherence among patients with HF in Saudi Arabia have not been thoroughly examined, and the characteristics of this population remain largely unknown. Even in countries where self-care guidelines have been developed and validated tools created, a significant proportion of patients continue to engage in sub-optimal self-care practices. Understanding population characteristics from a cultural and contextual perspective may play a crucial role in improving self-care behaviours. Without culturally informed and locally appropriate insights, sub-optimal or ineffective self-care is likely to persist, contributing to substantial social and economic burdens on individuals, families, and the healthcare system (Jaarsma et al., 2003). The knowledge generated from this study will assist clinicians, researchers, and policymakers in gaining a better understanding of self-care behaviours among HF patients in Saudi Arabia and the factors influencing adherence. These findings will also support the development of culturally and contextually appropriate interventions aimed at enhancing self-care in this population.

Chapter Two: Literature Review

2.1 Introduction

This chapter presents a literature review that lays the foundations for this thesis by introducing the context of the study, providing an introduction, background and rationale for investigating self-care practices and factors influencing the adherence to self-care recommendations in patients with HF. The chapter begins with a description of the review's aim and question, then explains the chosen review design and methods used to search the literature for data extraction and data analysis. The results of the review are then presented and discussed, including an evaluation of the review's strengths and limitations. Finally, the implications of the review findings are considered. The content of this chapter is currently being prepared for submission for publication as a journal paper.

2.2 Review Aim and Question

Heart failure is a serious public health issue, posing a significant global morbidity and mortality burden on individuals and society (Metra & Teerlink, 2017). Optimum treatment of HF involves long-term complex pharmacotherapy and patient education on lifestyle change and self-management (Sapna et al., 2023). Understanding the factors that facilitate and hinder self-management is essential for developing effective education, training and behaviour change programs aimed at improving self-care in patients with HF. As part of this study, an integrative review of the existing empirical literature was conducted to identify variables that have been significantly associated with self-care adherence. These variables, combined with insights from the qualitative interviews, were then used to inform the regression analysis in the subsequent phase of the study. This phase sought to answer the following research question:

What factors have been demonstrated as determinants or predictors of self-care adherence in patients living with heart failure?

2.3 Design

An integrative review was conducted to summarise previous qualitative and/or quantitative study findings, regardless of the methodological basis, to provide an understanding of the identified phenomenon. Whittemore and Knafl's integrative review methodology provided a

valuable framework for this review, enabling the compilation of the various forms of information that were expected to be available to address the review question (Whittemore & Knafl, 2005). The integrative review process comprised five stages: 1- Formulating the problem; 2- Searching literature(s); 3- Evaluating the quality of data; 4- Analysing the data; and 5- Interpreting and presenting the results (Whittemore & Knafl, 2005). The report for the review adhered to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) checklist, ensuring comprehensive and transparent reporting of review findings (Page et al., 2021). By following the PRISMA guidelines, the report systematically described the research methodology, including the search strategy, study selection process, data extraction methods, and synthesis of results.

2.4 Search Methods

A systematic search strategy was developed. The search terms used combined MESH headings and keywords:

((MH "Heart failure") OR "Heart failure" OR "Cardiac failure") AND

((MH "self-care" OR "self-care" OR (MH "Self management") OR "Self management") AND

("factor*" OR "predict*" OR "determin*" OR "facilitat*" OR "barrier*" OR "influence") (see Appendix 1 for an example strategy).

The search was limited to human subjects and English language literature, targeting studies published between October 2009 to March 2024, inclusive.

The inclusion criteria for this review were studies that:

- (i) recruited patients who were medically diagnosed with HF.
- (ii) recruited adults aged 18 years or older.
- (iii) recruited both male and female participants.
- (iv) included only original studies, i.e., reported primary research.

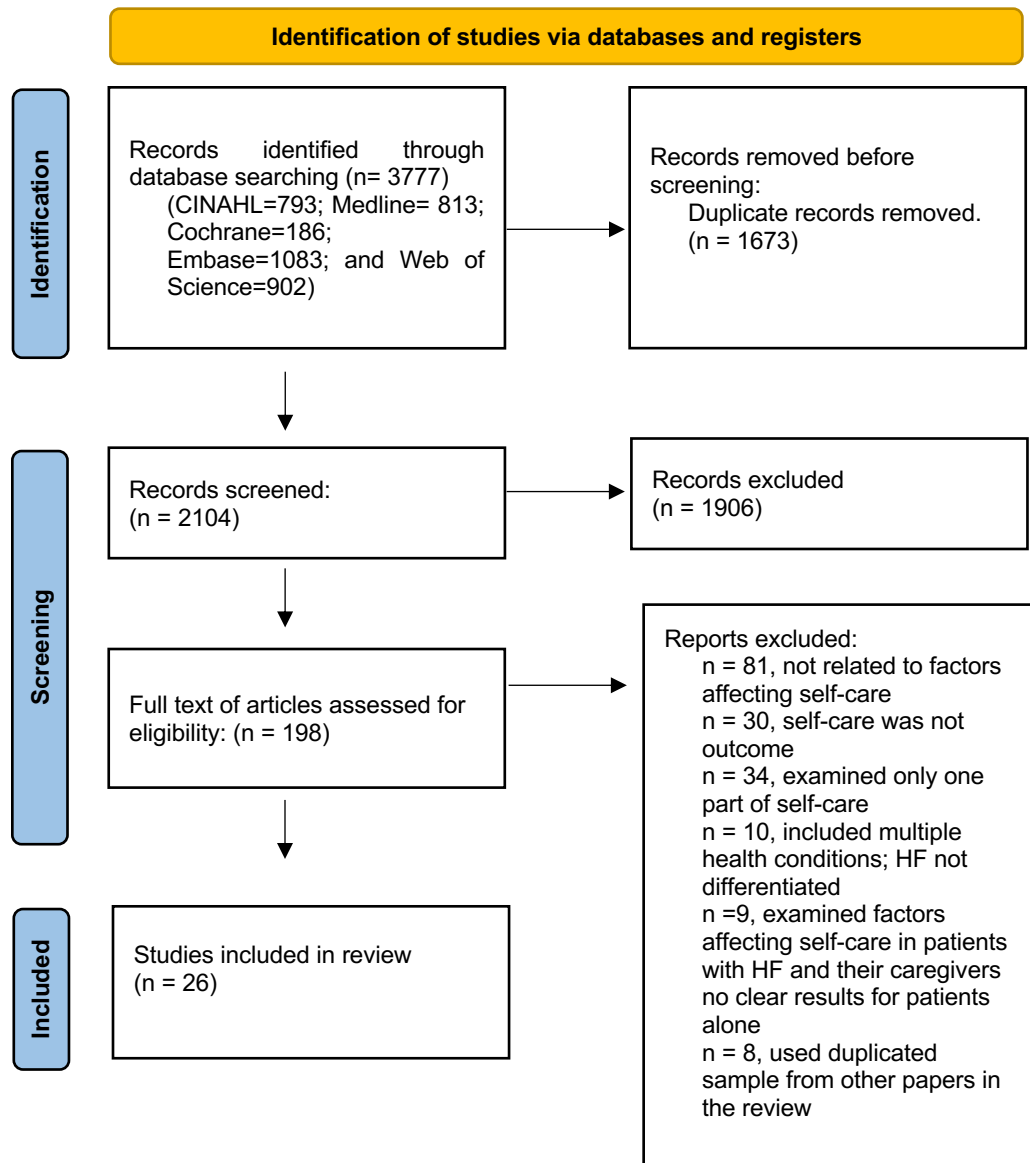
Review papers, case studies, discussion papers or conference abstracts were excluded, but their reference lists were searched for any additional eligible studies. The searches were conducted using the electronic databases Cumulative Index to Nursing and Allied Health

Literature (CINAHL), Medline, Cochrane, Excerpta Medica data BASE (Embase) and Web of Science. (See Appendix 1 for example search strategy).

2.5 Search Outcome

Initial database searches retrieved 3777 papers. These papers were imported into Endnote© Version 20 and then screened for duplicates. The removal of 1673 duplicates left 2104 citations for the title and abstract screening, which excluded a further 1906 ineligible papers. During the full-text review phase, 172 papers were excluded. Papers were excluded if they lacked relevance to self-care factors, focused on other outcomes, addressed only one aspect of self-care, combined HF with other conditions without clear distinction, included caregivers without separate patient data, or used duplicated samples. This process resulted in 26 papers being included in the review. Outcomes of the literature search and screening are provided in Figure 2. The reference lists of reviews and relevant papers were also searched for additional eligible papers; no additional study was found from this process.

Figure 2: PRISMA 2020 Flow Diagram



Note. Adapted from “The PRISMA 2020 statement: an updated guideline for reporting systematic reviews” by M. J. Page, 2021, *Rev Esp Cardiol* (Engl Ed), 74(9), 790–799). BMJ 2021;372: n71 <http://dx.doi.org/10.1136/bmj.n71>

2.6 Critical Appraisal Process

The mixed methods assessment tool (MMAT-v2018) was used to assess the quality of the papers of various study designs (Hong et al., 2018), including quantitative, qualitative, and mixed methods studies. Studies were appraised against relevant criteria for each methodology. Responses to the methodological quality criteria were scored on a categorical scale as “no,” “yes,” or “cannot tell”. The 26 included papers were evaluated and completed independently by two reviewers; no papers were excluded on a methodological basis and the scores were presented using stars (*), where (*****) reflected 100% quality criteria met (see Table 2 and Appendix 2 for the full MMAT critical appraisal scores).

Table 2: Summary of Critical Appraisal Scores using MMAT

Author & year	MMAT scores
1. Al-Hammouri et al., 2020	***
2. Aljohani et al., 2023	*
3. Alkouri et al., 2022	****
4. Cameron et al., 2009	*****
5. Clark et al., 2009	***
6. Cocchier et al., 2015	**
7. Davis et al., 2015	****
8. Gallagher et al., 2011	*
9. Getachew et al., 2022	****
10. Gomes da Silva et al., 2023	***
11. Graven et al., 2019	***
12. Kato et al., 2009	****
13. Lee et al., 2019	***
14. Liu et al., 2014	**
15. Massouh et al., 2020	***
16. Muller-Tasch et al., 2018	*****
17. Ok et al., 2015	*****
18. Peters-Klimm et al., 2013	**
19. Sedlar et al., 2021	*****
20. Siabani et al., 2016	****
21. Son et al., 2018	**
22. Tawalbeh et al., 2017	***
23. Tung et al. 2012	***
24. Uchmanowicz et al. 2017	***
25. Vaughan et al., 2013	**
26. Zhang et al., 2023	***

2.7 Data Extraction

Relevant data to address the review research question were extracted from each study using a data extraction table comprising the first author's last name and publication year, study setting and location, study design and instrument used, and participants' characteristics (e.g., sample size, age, gender, marital status, if they had a caregiver, severity of heart failure based on NYHA class, etc.) (Table 3).

Variables were identified, coded to the relevant sub-section of the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2016; Riegel et al., 2022) and extracted to address the study research question, as depicted in Table 4.

Table 3: Study Characteristics

Author, year	Setting; location	Study design; data collection method; outcome variables	Participants' characteristics: N Age mean (SD) years. Gender, male: % Marital status: % Have caregiver: % NYHA % per class
1. Al-Hammouri et al., 2020	Hospital; Jordan	Cross-sectional study; questionnaires; SCHFI	N=107 Age 58.5 (11.7) years Gender, male: 78.5 % Marital status married: no data Has caregiver: no data NYHA Class I: 7.5%, II: 41.0%, III: 36.5%, IV:15.0%
2. Aljohani et al., 2023	Hospital outpatient clinics; Saudi Arabia	Cross-sectional study; questionnaires; SCHFI	N= 245 Age 56.51(9.70) years Gender, male 70% Marital status married: 79.6%, single/widow:20.4% Has caregiver: no data NYHA Class: no data
3. Alkouri et al., 2022	Hospital outpatient clinics; Jordan	Cross-sectional study; questionnaires; EHFSCBS-9	N=300 Age 61.2 (12.6) years Gender: male 67.3% Marital status single: 1.7%, married: 79.0%, divorced: 0.7%, widow: 18.3%, separated: 0.3% living with others: 32.0%, living alone; 1.7% Has caregiver: no data NYHA Class I: 12.7%, II: 36.7%, III: 42.3%, IV: 8.3%
4. Cameron et al., 2009	Hospital; Australia	Cross-sectional study; questionnaires; SCHFI	N=50 Age 73 (11) years Gender, male: 76% Marital status married: 60% Has caregiver: 72% NYHA Class I & II: 50%, class III & IV: 50%
5. Clark et al., 2009	Hospital; Canada	Qualitative; semi- structured interviews	N= 42 patients, N=30 caregivers. Age 76 years Gender, male: 64% Marital status: no data Has caregiver: 63% NYHA Class I & II: 100%

6- Cocchier et al., 2015	Hospital outpatient clinics; Italy	Cross-sectional study; questionnaires; SCHFI	N=1192 Age 72 (11) years Gender, male: 58% Marital status married 57%, widowed: 30%, single: 6.7%, divorced 6.5% Has caregiver:75.8% NYHA Class I: 16.7%, II: 42.5%, III: 33%, IV: 7.8%
7. Davis et al., 2015	Hospital; US	Cross-sectional study; questionnaires; SCHFI	N=125 Age 59 (13) years Gender, male: 53% Marital status married: 39% Has caregiver: no data NYHA Class I: 2%, II: 46%, III: 47%, IV: 5%
8. Gallagher et al., 2011	Hospital; Netherlands	Cross-sectional study; questionnaires; EHFSBs-12	N=333 Age 72 (11) years Gender, male: 66% Marital status married: 56%, divorced: 4%, widowed:29% Has caregiver:56% NYHA Class II: 6%, III: 51%, IV: 42%
9. Getachew et al., 2022	Hospital outpatient clinics; Ethiopia	Cross-sectional study; questionnaires; EHFSBs-11	N= 420 Age 47.42 (15.89) years Gender, male: 47.1% Marital status, single:10.5%, married: 71.2%, divorced:6.2%, widowed: 11.9% live alone: 8.1%, with family: 80.2%, with non-family:11.7% Has caregiver: no data NYHA Class I: 13.1%, II: 39.3%, III: 32.4%, IV: 15.2%
10. Gomes da Silva et al., 2023	Hospital outpatient clinics; Brazil	Cross-sectional study; questionnaires; SCHFI	N=405 Age 54.77(10.83) years Gender, male: 57.3% Marital status: married: 64.7%, single: 16.5%, divorced 11.1%, widowed 7.7%. live alone: 12.1% Has caregiver: no data NYHA Class I: 46.7%, II: 46.4%, III: 6.9%
11. Graven et al., 2019	Hospital; US	Cross-sectional study; questionnaires; SCHFI	N=107 Age 61 (13.9) years Gender, male: 54.2%

			Marital status married: 42.1%, unmarried: 57.9% NYHA Class I: 8.4%, II: 43.9%, III: 18.7%, IV: 29%
12. Kato et al., 2009	Hospital outpatient clinics; Japan	Cross-sectional study; questionnaires; EHFScBs-12	N=116 Age 64.6 (15.3) years Gender, male: 70.7% Marital status married: 73.3%, single: 12.9%, widowed, divorced, others: 13.8% NYHA Class I: 25.9%, II: 54.3%, III: 19.8%
13. Lee et al., 2019	Hospital outpatient clinics; Korea	Cross-sectional study; questionnaires; SCHFI	N=132 Age 60 (12.8) years Gender, male: 72.0% Marital status: no data Has caregiver: 87.9% NYHA Class I: 22.7%, II: 65.9%, III& IV: 11.4%
14. Liu et al., 2014	Hospital outpatient clinics; Taiwan	Cross-sectional study; questionnaires; EHFScBs-12	N=141 Age 68 (13.7) years Gender, male: 51.8% Marital status: married: 61.0%, unmarried: 39% Has caregiver: no data NYHA Class II: 56.7%, class III: 43.3%
15. Massouh et al., 2020	Hospital outpatient clinics and inpatient clinics; Lebanon	Cross-sectional study; questionnaires; SCHFI	N= 100. Age 67.59 (12.09) years Gender, male: 76% Marital status married: 78%, living alone 4% Has caregiver: no data NYHA Class I: 12%, II: 39 %, III: 48%, IV: 1%
16. Muller-Tasch et al., 2018	Hospital outpatient clinics; Germany	Cross-sectional study; questionnaires; EHFScBs-12	N=308 Age 63.6 years Gender, male: 57.6% Marital status: married: 64.6 %, living with spouse: 72.7% Has caregiver: no data NYHA Class I: 3.2%, II: 39.3%, III: 31.7%, IV: 0.7%
17. Ok et al., 2015	Hospital outpatient clinics; Korea	Cross-sectional study; questionnaires; EHFScBs-12	N=280 Age 59.5 (13.83) years Gender, male: 65%

			Marital status: married: 73.6%, single: 9.3%, divorced: 3.6%, others: 13.6% Has caregiver: no data NYHA Class I: 50.7%, II: 39.6%, III: 9.6%
18.Peters-Klimm et al., 2013	Primary care practices; Germany	Cross-sectional study; questionnaires; EHFSBs-12	N=318 Age 69 (10.4) years Gender, male: 71.4% Marital status: no data, living with others: 73.6% Has caregiver: no data NYHA Class I: 1.3%, II: 58.2%, III: 39.0%, IV: 1.6%
19. Sedlar et al., 2021	Hospital outpatient clinics; Slovenia	Mixed method: (qualitative semi-structured interviews & quantitative cross-sectional study; questionnaires); EHFSBs-9	N=80 Age 72 (10) years Gender, male: 58% Marital status single: 5%, married: 65%, divorced:1%, widowed: 25% Has caregiver: no data NYHA Class II & IV: 100%
20.Siabani et al., 2016	Hospital; Iran	Cross-sectional study; questionnaires; SCHFI	N=231 Age 66 years Gender, male: 51.5% Marital status: no data. Has spouse: 59.4% Has caregiver: no data NYHA Class: no data
21.Son et al., 2018	Hospital outpatient clinics; Korea	Cross-sectional study; questionnaires; EHFSBs-9	N=171 Age 68.7 (11.1) years Gender, male: 60.9% Marital status: no data, lived alone: 20.3%, with spouse only: 48.4%, with family 31.3% Has caregiver: no data NYHA Class I: 60.5%, II: 30.6%, III: 8.9%
22.Tawalbeh et al., 2017	Hospital outpatient clinics; Jordan	Cross-sectional study; questionnaires; SCHFI	N=236 Age 56.92 (12.29) years Gender, male: 61.90 % Marital status married: 65.90 %, unmarried: 34.10 Has caregiver: no data NYHA Class: no data

23. Tung et al., 2012	Hospital outpatient clinics; Taiwan	Cross-sectional study; questionnaires; SCHFI	N=86 Age 65.73(12.56) years Gender, male: 73.0% Marital status married: 67.4%, single/divorced/widowed 32.6% Has caregiver: 14% NYHA Class II: 75.6%, III: 24.4%
24. Uchmanowicz et al., 2017	Hospital outpatient clinics; Poland	Cross-sectional study; questionnaires; EHFScBs-9	N=270 Age 72.57 (8.23) years Gender, male: 48.89 % Marital status married: 56.67%, single 43.33% Has caregiver: no data NYHA Class II: 41.85%, III 33.70%, IV 20.74%
25. Vaughan et al., 2013	Hospital outpatient clinics and inpatient clinics; US	Mixed method: (qualitative semi-structured interviews & quantitative cross-sectional study; questionnaires); SCHFI	N=30 Age 59.63 (15) years Gender, male: 60% Marital status married: 40%, Single, divorced, widowed 60% Has caregiver: 80% NYHA Class II: 33.3%, IV: 66.6%
26. Zhang et al., 2023	Hospital; China	Cross-sectional study; questionnaires; SCHFI	N=204 Age 62.88 (14.14) years Gender, male: 57.8% Marital status married: 83.3, not married: 16.7%, living alone: 6.9%, living with spouse 40.2%, living with children: 16.7%, others 36.3% Has caregiver: no data NYHA Class II: 23.0 %, III: 52.9%, IV: 24.0%

N: sample size, SD: standard deviation, NYHA: New York Heart Association, SCHFI: Self-care of heart failure Index, EHFScBs: European heart failure self-care behaviour scale, US: United States.

Table 4: Factors Identified as Determining or Predicting Self-Care in Patients with Heart Failure in the Reviewed Studies, Coded According to the Situation-Specific Theory of Heart Failure (Riegel et al., 2016; Riegel et al., 2022).

Categories of Factors	Examples
Personal factors	<ol style="list-style-type: none"> 1. Age 2. Gender 3. Marital status 4. Education 5. Employment 6. Family income 7. Race and ethnicity 8. HF knowledge 9. Health literacy 10. Self-care confidence 11. Self-efficacy 12. Perceived control 13. Health locus of control 14. Cultural identity and cultural norms and values 15. Spirituality and religious beliefs 16. Quality of life 17. Feeling about disease 18. Impulsivity 19. Perceived stress 20. Smoking 21. Sedentary lifestyle
Disease or problem factors	<ol style="list-style-type: none"> 1. Cognitive function 2. Executive functions 3. HF duration 4. Acute healthcare services e.g. hospital admissions, cardiac referrals 5. Symptom severity e.g. NYHA, LVEF 6. Functional status 7. Comorbidity 8. Frailty 9. Treatment e.g. prosthetic heart valve 10. Number and class of medications
Environmental factors	<ol style="list-style-type: none"> 1. Social support 2. Social situation 3. Living area

Note. Adapted from "The Situation-Specific Theory of Heart Failure Self-care An Update on the Problem, Person, and Environmental Factors Influencing Heart Failure Self-care" by B. Riegel, 2022, *The Journal of Cardiovascular Nursing*, 37(6), 515-529, 11/12 2022. | DOI: 10.1097/JCN.0000000000000919

2.8 Data Analysis

A narrative analysis can summarise, describe and interpret evidence on a particular topic/question using either qualitative and/or quantitative evidence (Mays et al., 2005). Various types of data were extracted from empirical and/or theoretical studies; therefore, narrative analysis was deemed an appropriate approach for synthesising these data. This approach allowed the findings and interpretations from published studies to be examined on their own terms, without the necessity of converting them into a common metric for analytical purposes (Mays et al., 2005).

In setting up the framework for analysis, two approaches were employed. First, deductive coding aligned with the structure of the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2016; Riegel et al., 2022) was utilised to categorise data as: personal, disease or problem, or environmental factors. Additionally, an inductive approach was implemented to identify other factors not captured by this theory. Nonetheless, all factors were ultimately able to be coded within the framework of the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2016; Riegel et al., 2022).

2.9 Review Rigor

A comprehensive approach to thorough narrative analysis enables a detailed examination of key findings and patterns, as well as a comparison of content and relationships within the literature (Mays et al., 2005). Whittemore and Knafl's framework for integrative review offered several advantages, ensuring the quality and credibility of research synthesis. Utilising a systematic approach to literature review ensured that relevant studies were identified, screened, and included based on predefined criteria. Utilising tools like the PRISMA recommendations to document the review process ensured transparent reporting, including clear documentation of search strategies, study selection criteria, and data extraction methods, thereby enhancing the replicability of the review and enabling readers to assess the reliability of the findings. Whittemore and Knafl's framework encouraged reflexivity, prompting the reviewers to critically reflect on their assumptions, biases and interpretations throughout the review process (Whittemore & Knafl, 2005). Furthermore, a rigorous appraisal of study quality was incorporated, taking into account factors such as methodological rigor, sample representativeness, and data validity. Both the data extraction process and the quality appraisal of studies were conducted

independently by at least two reviewers per paper (the researcher plus one or another supervisor). These approaches altogether were utilised to enhance the rigor of the review procedures and findings.

2.10 Results

2.10.1 Overview of Research Designs and Participant Demographics

The 26 included studies used a variety of research designs, comprising mixed-method design ($n = 2$), quantitative observational ($n = 23$) and qualitative studies ($n = 1$). The studies originated from multiple countries, including the US ($n = 3$), Korea ($n = 3$), Jordan ($n = 3$), Taiwan ($n = 2$), Germany ($n = 2$), and one study each from Australia, Canada, Italy, Netherlands, Japan, Iran, Poland, Saudi Arabia, Ethiopia, Brazil, Lebanon, Slovenia and China. The total number of participants across these studies was 6056, with sample sizes ranging from 30 (Vaughan et al., 2013) to 1,192 (Cocchieri et al., 2015).

Seventeen studies recruited participants from out-patient clinics, while eight studies enrolled participants during hospital admissions (Al-Hammouri et al., 2020; Cameron et al., 2009; Clark et al., 2009; Davis et al., 2015; Gallagher et al., 2011; Graven et al., 2019; Siabani et al., 2016; Zhang et al., 2023). One study recruited participants from community outpatient settings (Peters-Klimm et al., 2013). Participants' ages ranged between 19 and 94 years, with a mean age of 66.1 years. The overall gender distribution was 63.3% male (Table 2).

HF severity was assessed using the left ventricle ejection fraction (LVEF) and/or the New York Heart Association (NYHA) classification. Most participants in all studies that reported HF severity were classified as NYHA class II or III (mild-moderate), with three studies not reporting the participants' HF severity (Aljohani, 2023; Siabani et al., 2016; Tawalbeh et al., 2017).

2.10.2 Assessment of Self-Care Adherence in Heart Failure: Instruments and Influencing Factors

Adherence to self-care was assessed using a variety of methods. Two scales were predominantly utilised: the self-care of heart failure index (SCHFI) (Riegel et al., 2009) and the European heart failure self-care behaviour scale (EHFSBS) (Jaarsma et al., 2003). The SCHFI, developed from the Situation-Specific Theory of Heart Failure Self-Care, assesses self-care across three subscales of self-care maintenance, self-care management and self-care confidence (Riegel et al., 2009). In contrast, the European Heart Failure Self-care Behaviour scale (EHFSBS) was

derived from Orem's theory and assesses self-care management behaviours (Jaarsma et al., 2003).

Thirteen studies used the SCHFI (Al-Hammouri et al., 2020; Aljohani, 2023; Cameron et al., 2009; Cocchieri et al., 2015; Davis et al., 2015; Gomes da Silva et al., 2023; Graven et al., 2019; Lee et al., 2019; Massouh et al., 2020; Siabani et al., 2016; Tawalbeh et al., 2017; Tung et al., 2012; Zhang et al., 2023). The EHFSBS was used in the 9-item version in three studies (Alkouri et al., 2022; Son et al., 2018; Uchmanowicz et al., 2017) and the 12-item version in seven studies (Gallagher et al., 2011; Getachew et al., 2022; Kato et al., 2009; Liu et al., 2014; Muller-Tasch et al., 2018; Ok & Choi, 2015; Peters-Klimm et al., 2013). One study employed a mixed-methods approach, using qualitative interviews alongside the SCHFI (Vaughan et al., 2013), while another study combined qualitative interviews with the EHFSBS-9 (Sedlar et al., 2021). The final study used solely qualitative interviews (Clark et al., 2015).

Variables and relevant data extracted from included studies are set out in Table 5.

Table 5: Variables and Relevant Data Extracted from Included Studies

Authors, Year/Country	Outcome (Independent) Variable(s)/Adjusted Variable(s)	Dependent Variable(s) & Main Finding(s)			
1. Al-Hammouri et al., 2020/ Jordan	Better self-care maintenance:	1- HF knowledge 2- Self-care confidence 3- Impulsivity 4- HF severity 5- Depression	$\beta = -.73$ $\beta = 0.27$ $\beta = -.37$ $\beta = -3.00$ $\beta = 0.08$	$p = 0.02^*$ $p = 0.00^{**}$ $p = 0.02^*$ $p = 0.08$ $p = 0.73$	$R^2 = 0.28$
	Better Self-care confidence:	1- HF knowledge 1- Impulsivity 2- Perceived stress 3- The interaction term between impulsivity and perceived stress 5- HF severity 6- Depression	$\beta = 0.29$ $\beta = -1.62$ $\beta = -4.99$ $\beta = 0.06$ $\beta = -2.13$ $\beta = 0.53$	$p = 0.50$ $p = 0.01^*$ $p = 0.02^*$ $p = 0.04^*$ $p = 0.38$ $p = 0.14$	
2. Aljohani et al., 2023/ Saudi Arabia	Better self-care maintenance: Mean \pm SD SCHFI-maintenance: 3.375 \pm 0.647 Converted to 59.4 \pm 16.2	1- Mean \pm SD age: 56.51 \pm 9.70 years 2- Gender, male n (%): 172 (70.2%) 3- Education, no education n (%): 67 (27.3%) 4- Employment, no employment n (%): 102 (41.6%) 5- Mean \pm SD self-care confidence: 4.19 \pm 0.695 6- HF duration, mean \pm SD duration: 3.60 \pm 4.43 7- Previous hospitalisations because of HF mean \pm SD admissions number: 1.18 \pm 1.52 8- Social situation: mean \pm SD number of family members: 4.86 \pm 3.38	$\beta = 0.004$ $\beta = 0.008$ $\beta = 0.117$ $\beta = 0.160$ $\beta = 1.84$ $\beta = 0.002$ $\beta = 0.005$ $\beta = 0.002$	$p = 0.000^{**}$ $p = 0.640$	$R^2 = 0.15$
	Better self-care monitoring: Mean \pm SD SCHFI-monitoring: 3.36 \pm 0.721	1- Mean \pm SD age: 56.51 \pm 9.70 years 2- Gender, male n (%): 172 (70.2%) 3- Education, no education n (%): 67 (27.3%) 4- Employment, no employment n (%): 102 (41.6%) 5- Mean \pm SD self-care confidence: 4.19 \pm 0.695	$\beta = 0.004$ $\beta = 0.098$ $\beta = 0.27$ $\beta = 0.348$ $\beta = 1.141$	$p = 0.000^{**}$	$R^2 = 0.08$

		6- HF duration, mean \pm SD duration: 3.60 ± 4.43 7- Previous hospitalisations because of HF mean \pm SD admissions number: 1.18 ± 1.52 8- Social situation: mean \pm SD number of family members: 4.86 ± 3.38	$\beta = 0.007$ $\beta = 0.085$ $\beta = 0.014$	$p = 0.005^*$	
	Better self-care management: Mean \pm SD SCHFI-management: 3.75 ± 0.569 Converted to 67.5 ± 16.3	1- Mean \pm SD age: 56.51 ± 9.70 years 2- Gender, male n (%): 172 (70.2%) 3- Education, no education n (%): 67 (27.3%) 4- Employment, no employment n (%): 102 (41.6%) 5- Mean \pm SD self-care confidence: 4.19 ± 0.695 6- HF duration, mean \pm SD duration: 3.60 ± 4.43 7- Previous hospitalisations because of HF mean \pm SD admissions number: 1.18 ± 1.52 8- Social situation: mean \pm SD number of family members: 4.86 ± 3.38	$\beta = 0.001$ $\beta = 0.173$ $\beta = 0.038$ $\beta = 0.193$ $\beta = 2.148$ $\beta = 0.005$ $\beta = 0.001$ $\beta = 0.007$	$p = 0.191$	$R^2 = 0.21$
3. Alkouri et al., 2022/ Jordan	Better self-care behaviours adherence: Mean \pm SD EHFSCBS-9 27.5 ± 4.7	1- Marital status, married n (%): 237 (79.0 %) 2- Insomnia n (%): 110 (36.7%) 3- DM n (%): 160 (53.3)	$\beta = -1.555$ $\beta = 2.066$ $\beta = 0.910$	$p = 0.018^*$ $p = 0.001^{**}$ $p = 0.080$	
4. Cameron et al. 2009/ Australia	Better self-care maintenance: Mean \pm SD SCHFI-maintenance: 67.8 ± 17.3 (range 25-100)	1- Mean \pm SD Age: 73 ± 11 years, older age 2- Gender, male n (%): 38 (76%) 3- Self-care confidence, mean \pm SD: 62.0 ± 19.9 (Range 25-100) 4- Cognitive function, MMSE score < 27 n (%): 18 (36%) 5- Comorbidity, significant CCI score n (%): 18 (36%) 6- Depression, any levels n (%): 27 (53%) 7- Social situation, living with support n (%): 36 (72%)	$\beta = 0.51$ $\beta = -0.01$ $\beta = 0.07$ $\beta = 0.23$ $\beta = 0.34$ $\beta = -0.16$ $\beta = 0.15$	$p < 0.01^*$ $p = 0.92$ $p = 0.64$ $p = 0.13$ $p = 0.02^*$ $p = 0.28$ $p = 0.25$	$R^2 = 0.39$
	Better self-care management:	1- Mean \pm SD Age: 73 ± 11 years 2- Gender: male n (%): 38 (76%)	$\beta = 0.02$ $\beta = -0.33$	$p = 0.91$ $p < 0.05^*$	$R^2 = 0.34$

	Mean \pm SD SCHFI-management: 50.0 \pm 16.6 (range 16.6-91.7)	3- Mean \pm SD self-care confidence: 62.0 \pm 19.9 (range 25-100), higher 4- Cognitive function: MMSE score < 27 n (%): 18 (36%) 5- Comorbidity: significant CCI score n (%): 18 (36%) 6- Depression: any levels n (%): 27 (53%) 7- Social situation: living with support n (%): 36 (72%)	$\beta=0.39$ $\beta=0.25$ $\beta=0.33$ $\beta=0.32$ $\beta=-0.006$	<p>$p < 0.01^*$</p> <p>$p = 0.09$</p> <p>$p < 0.05^*$</p> <p>$p < 0.05^*$</p> <p>$p = 0.97$</p>	
5. Clark et al. 2009/ Canada	Interview:	Factors consistently reported to influence self-care: *Knowledge as a partial determinant of self-care *Faith and views about health professionals and services as determinants of self-care *Values linked to culture, history, and place			
6- Cocchieri et al. 2015/ Italy	Inadequate self-care maintenance: Mean SCHFI-maintenance: 55.3	1- Mean \pm SD age: 72.3 \pm 11.2 years, older age 2- Gender, male n (%): 694 (58.2%) 3- Mean \pm SD cognitive function, MMSE score; 24.2 (6), lower 4- Mean \pm SD HF duration in months: 4.3 \pm 3.7, shorter time 5- Mean \pm SD number of medications: 4.3 \pm 2.4, lesser number 6-The presence of caregiver, yes n (%): 904 (75.8%)	$\beta=-0.135$ $\beta=-0.104$ $\beta=0.158$ $\beta=0.102$ $\beta = 0.275$ $\beta=-0.131$	<p>$p < 0.01^{**}$</p> <p>$p < 0.01^*$</p> <p>$p < 0.001^{**}$</p> <p>$p < 0.01^*$</p> <p>$p < 0.001^{**}$</p> <p>$p < 0.001^{**}$</p>	$R^2=0.16$
	Inadequate self-care management: Mean SCHFI-management: 53.2	1- Gender: male n (%): 694 (58.2%) 2- Mean \pm SD cognitive function: MMSE score 24.2 (6) lower 3- Employment: being unemployed n (%): 977 (82%) 4- HF severity, higher NYHA score, NYHA III & IV n (%): 486 (40.8%)	$\beta= -0.147$ $\beta= 0.213$ $\beta= 0.216$ $\beta=-0.116$	<p>$p < 0.01^*$</p> <p>$p < 0.001^{**}$</p> <p>$p < 0.001^{**}$</p> <p>$p < 0.05^*$</p>	
	Inadequate self-care confidence: Mean SCHFI-confidence: 54.6	1- Mean \pm SD age: 72.3 \pm 11.2 years, older 2- Gender: male n (%): 694 (58.2%) 3- Mean \pm SD cognitive function, MMSE score 24.2 (6), lower 4- Mean \pm SD number of medications: 4.4 \pm 2.4, fewer	$\beta=-0.142$ $\beta=-0.114$ $\beta=0.324$ $\beta=0.265$	<p>$p < 0.001^{**}$</p> <p>$p < 0.01^*$</p> <p>$p < 0.001^{**}$</p> <p>$p < 0.001^{**}$</p>	$R^2=0.19$

7. Davis et al. 2015/ US	Better self-care maintenance: Mean SCHFI-maintenance: 63.57 ± 19.12	1- Gender, male n (%): 66 (53%) 2- HF knowledge level: mean ± SD DHFKS 11.2 ± 1.8, H=higher 3-Race, Black, non-Hispanic n (%): 84 (67%) 4- HF severity, NYHA III & IV n (%): 65 (52%), higher 5- Social support: mean ± SD ENRICH score 28.7 ± 5.2, higher	$\beta=0.93$ $\beta=2.49$ $\beta=7.63$ $\beta=7.55$ $\beta=0.78$	$p=0.770$ $p=0.01^*$ $p=0.030^*$ $p=0.003^*$ $p=0.013^*$	$R^2=0.22$
	Better self-care management: Mean SCHFI-management: 68.35 ± 20.24	1- Mean ± SD age: 59 ± 13 years, younger 2-Gender: male n (%): 66 (53%) 3- Education: high school diploma n (%): 96 (77%) 4- HF severity, NYHA III & IV n (%): 65 (52%), higher	$\beta=-0.33$ $\beta=0.50$ $\beta=11.21$ $\beta=10.94$	$p=0.015^*$ $p=0.884$ $p=0.006^*$ $p<0.001^{**}$	$R^2=0.19$
	Better self-care confidence: Mean SCHFI-confidence: 64.99 ± 16.06	1- Mean ± SD Age: 59 ± 13 years, younger 2- Gender: male n (%): 66 (53%) 3- Social support: mean ± SD ENRICH score 28.7 ± 5.2, higher	$\beta=-0.45$ $\beta=-2.97$ $\beta=0.78$	$p<0.001^*$ $p=0.258$ $p=0.003^*$	$R^2=0.20$
8. Gallagher et al. 2011/ Netherlands	Better self-care behaviours adherence: Mean ± SD EHFSBS-12: 25.59 ± 6.16	1- Mean ± SD age: 72 ± 11 years 2- Gender: male n (%): 218 (66%) 3- Education: primary education n (%): 120 (36%) 4- Comorbidity: DM n (%): 122 (36%), COBD n (%): 112 (34%) 5- HF severity, NYHA class III n (%): 170 (51%), class IV n (%): 139 (42%) 6- Previous hospitalisations for HF: admissions number ≥ 3 n (%): 60 (80%) 7- Depression: CESD score ≥ 16 n (%): 129 (39%) 8- Mean ± SD social support, low or medium ≤ 9: 25.64 ± 5.54	$\beta=-2.65$	$p=0.09$ $p=0.28$ $p=0.19$ $p=0.45$ $p=0.630$ $p=0.594$ $p=0.50$ $p=0.005^*$	$R^2=0.22$
9. Getachew et al., 2022/Ethiopia	Better self-care behaviours adherence:	1- Marital status single n (%): 44 (10.5), married n (%), 299 (71.2), divorced n (%): 27 (6.4), widowed n (%): 50 (11.9)			

	Mean ± SD EHFSCBS-11: 30.74	<p>2- HF severity, NYHA class I n (%):55 (13.1), class II n (%):165 (39.3), class III n (%): 136 32.4, class IV n (%): 64 15.2</p> <p>3- Previous hospitalisations because of HF, <3 n (%): 371 (88.5), 4–6 n (%): 38 (9.1), >7 n (%): 11 2.4</p> <p>4- Presence of depressive symptoms yes n (%): 236 (56.2)</p> <p>5- Treatment with a beta-blocker n (%):319 (76.0)</p> <p>6- Treatment with digitalis n (%): 316 (75.2)</p> <p>7- Social support, low n (%): 83 (19.8), Moderate n (%): 206 (49.0), High n (%): 131 (31.2)</p>		<p>p < 0.001**</p> <p>p = 0.005*</p> <p>p < 0.001**</p> <p>p < 0.001**</p>	
10. Gomes da Silva et al., 2023/ Brazil	Better self-care maintenance: Adequate SCHFI-maintenance n (%):74 (18%)	<p>1- Education: completed high School n (%): 193(47.7)</p> <p>2- Monthly income: Up to 1 minimum wage n (%): 305 (75.3)</p> <p>3- Feeling about disease, positive or natural</p> <p>4- Smoking status: smoker n (%): 34(8.4)</p> <p>5- Sedentarism lifestyle: n (%):196(48.4)</p> <p>6- Cognitive status: mean MoCA score:</p> <p>7- HF severity, Mean ± SD LVEF: 42.20 ± 13.76, increase</p> <p>8- Hospitalisation in the previous 12 months n (%): 191(47.2)</p> <p>9- Previous hospitalisations because of HF: Median (min – max) admissions number: 1(1-20)</p> <p>10- Arterial hypertension n (%):332(82.0)</p> <p>11- Dialytic chronic kidney disease n (%): 46 (11.3), yes</p> <p>12- Dyslipidemia n (%): 268(66.2)</p> <p>13- Obesity n (%): 118(29.1), decrease</p> <p>14- Median (min–max) number of daily medication doses: 8(0-26)</p> <p>15- Social situation: median (IQR) number of children 2(2;3), decrease</p>		<p>p = 0.03*</p> <p>p < 0.01**</p> <p>p < 0.01**</p> <p>p = 0.02*</p> <p>p < 0.01**</p>	R ² = 0.27

	Better self-care management: Adequate SCHFI-management n (%):186 (6%)	1- Monthly income: Up to 1 min wage n (%): 305 (75.3) 2- Sleep apnea n (%): 8 (2.0), yes 3- COBD n (%): 4- Married children, no 5- Social situation: median (IQR) number of children 2 (2;3)		p <0.01** p <0.01**	R ² = 0.19
	Better self-care confidence: Adequate SCHFI-confidence n (%):101 (25%)	1- Education: completed high school n (%): 193(47.7) 2- Monthly income, 3 or more min wages n (%): 12.37 3- Race, Caucasian n (%): 142 (35.1) 4- Smoking status: smoker n (%): 34(8.4) 5- sedentary lifestyle: n (%): 196 (48.4), yes 6- Cognitive status: mean MoCA score: 7- HF Severity, mean \pm SD LVEF: 42.20 \pm 13.76, decreases 8- Hospitalisation in the previous 12 months decrease yes n (%): 191 (47.2) 9- Arterial hypertension n (%):332(82.0) 10- DM n (%): 119(29.4) 11- Dialytic chronic kidney disease n (%): 46 (11.3) 12- Dyslipidemia n (%): 268(66.2) 13- Obesity n (%): 118(29.1) 14- Median (min– max) number of medications: 8(0-26), decrease 15- Social situation: median (IQR) number of children 2(2;3)		p < 0.01** p < 0.01** p < 0.01** p = 0.01* p < 0.01**	R ² = 0.43
11. Graven et al. 2019/ US	Better self-care maintenance: Mean \pm SD SCHFI-maintenance: 59.68 \pm 16.22	1- Gender: male n (%): 58 (54.2%) 2- Race: non-Caucasian n (%): 60 (56%)	β =0.383 β =2.179	p=0.898 p=0.500	R ² = 0.10

	<u>Controlling for covariates (marital status, age)</u>				
	Inadequate self-care management: Mean \pm SD SCHFI-management: 57.2 \pm 20.1 <u>Controlling for marital status, education level, and age</u>	1- Gender: male n (%): 58 (54.2%) 2- Race: Caucasian n (%): 47 (44%)	$\beta=3.545$ $\beta=-11.188$	p=0.328 p= 0.006*	R ² = 0.19
	Better self-care confidence: Mean \pm SD SCHFI-confidence: 64.1 \pm 15.5	1- Gender: male n (%): 58 (54.2%) 2- Race: non-Caucasian n (%): 60 (56%)	$\beta=7.592$ $\beta=-4.244$	p=0.010* p=0.147	R ² = 0.05
12. Kato et al. 2009/ Japan	Inadequate self-care behaviours adherence: Mean \pm SD EHFSBS-12: 32.6 \pm 9.1 (range 16-52) <u>Adjusted for age and BNP</u>	1- Mean \pm SD age: 64.6 \pm 15.3 years 2- Employment status: Yes n (%): 50 (43.1%) 3- HF knowledge, mean \pm SD Heart Failure Knowledge Scale 5.1 \pm 1.8 4- Perceived control, mean \pm SD Health locus of control: 39.3 \pm 5.8 5- HF severity, median (IQR) BNP score: 77.8 (32.5-151.1) 6- Previous hospitalisations because of HF, 7- Comorbidity: DM n (%): 40 (34.5%)	$\beta=-0.13$ $\beta=0.23$ $\beta=-0.15$ $\beta=-0.13$ $\beta=-0.11$ $\beta=-0.16$ $\beta=0.19$	p=0.18 p = 0.02* p=0.09 p = 0.14 p = 0.23 p=0.08 p = 0.03*	R ² = 0.20
13. Lee et al. 2019/ Korea	Mean \pm SD SCHFI-maintenance: 54.5 \pm 16.6	<u>Patients with MCI, inadequate self-care maintenance</u> Mean \pm SD social support: Mos score 68.8 \pm 22.3 <u>Patients without MCI, inadequate self-care maintenance</u>	$\beta= 0.489$ $\beta=0.404$	p = 0.002* p <0.001**	R ² = 0.23 R ² = 0.16

	Mean ± SD SCHFI-management: 40.2 ± 17.5 Mean ± SD SCHFI-confidence: 44.1 ± 20.7	Mean ± SD perceived control: Control Attitude Scale-Revised score 27.9 ± 4.8			
		<u>Patients with MCI, inadequate self-care management</u> Mean ± SD Executive functions score: 72.8 ± 20.1	$\beta = 0.484$	$p = 0.006^*$	$R^2 = 0.23$
		<u>Patients without MCI Inadequate self-care management</u> Mean ± SD perceived control: Control Attitude Scale-Revised score 27.9 ± 4.8	$\beta = 0.262$	$p = 0.019^*$	$R^2 = 0.05$
14. Liu et al. 2014/ Taiwan	Better self-care behaviours adherence: Mean ± SD EHFSBS-12: 43.2 ± 9.4	1- Mean ± SD age: 68 ± 13.7 years 2- HF knowledge: mean ± SD DHFKS score 25.5 ± 20.7	$\beta = -0.21$ $\beta = -0.52$	$p = 0.013^*$ $p < 0.001^{**}$	$R^2 = 0.22$
15. Massouh et al., 2020/ Lebanon	Better self-care Maintenance: Mean ± SD SCHFI-maintenance: 67.26 ± 14.40	1- HF severity, NYHA class I: 12%, II: 39 %, III: 48%, IV: 1%, lower 2- HF knowledge, mean ± SD DHFKS: 10.25 ± 2.09, better 3- Mean ± SD self-care confidence: 69.50 ± 20.57, better 4- Social support, mean ± SD ENRICHED score: 24.72 ± 6.07, better	$\beta = -4.414$ $\beta = 1.668$ $\beta = 0.200$ $\beta = 0.316$	$p = 0.088^*$ $p = 0.011^*$ $p = 0.004^*$ $p = 0.151^*$	$R^2 = 0.29$
	Better self-care management: Mean ± SD SCHFI-management: 66.96 ± 21.29	1- HF knowledge, mean ± SD DHFKS: 10.25 ± 2.09 2- Mean ± SD self-care maintenance: 67.26 ± 14.40 3- Mean ± SD self-care confidence: 69.50 ± 20.57, better	$\beta = -0.123$ $\beta = -0.010$ $\beta = -0.041$	$p = 0.313$ $p = 0.597$ $p = 0.003^*$	$R^2 = 0.37$
	Better self-care confidence: Mean ± SD SCHFI-confidence: 69.50 ± 20.57	1- Employment, unemployment n (%): 65 (65%) 2- HF knowledge, mean ± SD DHFKS: 10.25 ± 2.09, better 3- Mean ± SD self-care maintenance: 67.26 ± 14.40, better	$\beta = -11.325$ $\beta = 2.587$ $\beta = 0.414$	$p = 0.002^*$ $p = 0.004^*$ $p = 0.002^*$	$R^2 = 0.28$

		4- Previous hospitalisations because of HF, no 72 (72%) 5- Social support, mean \pm SD ENRICHED score: 24.72 \pm 6.07	$\beta = -12.720$ $\beta = 0.313$	$p = 0.001^*$ $p = 0.295$	
16.Muller-Tasch et al. 2018/ Germany	Better self-care behaviours adherence: Mean \pm SD EHFSBS-12: 4.2 \pm 0.7 (Range 1-5)	1- Mean \pm SD Age: 63.6 years, older 2-Gender: male n (%): 227 (74%) 3- Education: high school n (%): 40 (15.7) 4- HF severity, NYHA class III n (%): 125 (75%) 5- Anxiety: PHQ n (%): 35 (12.8%) 6- Depression, mean \pm SD PHQ-9 score 6.7 \pm 4.8 7- Social situation: living with spouse n (%): 226 (72.7%)	$\beta = 0.208$ $\beta = 0.014$ $\beta = 0.078$ $\beta = -0.077$ $\beta = -0.061$ $\beta = -0.161$ $\beta = 0.165$	$p < 0.001^{**}$ $p = 0.820$ $p = 0.201$ $p = 0.231$ $p = 0.358$ $p = 0.019^*$ $p = 0.010^*$	$R^2 = 0.13$
17.Ok et al. 2015/ Korea	Better self-care behaviours adherence: Mean \pm SD EHFSBS-12: 31.98 \pm 6.81	1- Mean \pm SD age: 59.5 \pm 13.8 years, older age 2- Gender, male n (%): 182 (65.0%) 3- Marital status, married n (%): 206 (73.6%) 4- Employment, unemployed n (%): 156 (55.7%) 5- HF knowledge: mean \pm SD DHFKS score 8.7 \pm 2.5 6- HF severity, (NYHA) I n (%): 142 (50.7%) 6- HF severity, (NYHA) II n (%): 111 (39.6%) 7- Functional status: mean \pm SD DASI score 36.3 \pm 17.1 8- Mean \pm SD social support, MOS score 74.2 \pm 19.7	$\beta = -0.16$ $\beta = 0.05$ $\beta = 0.14$ $\beta = 0.03$ $\beta = -0.17$ $\beta = 0.09$ $\beta = 0.12$ $\beta = 0.19$ $\beta = -0.23$	$p = 0.031^*$ $p = 0.409$ $p = 0.020^*$ $p = 0.686$ $p = 0.006^*$ $p = 0.444$ $p = 0.269$ $p = 0.036^*$ $p < 0.001^*$	$R^2 = 0.15$
18.Peters-Klimm et al. 2013/ Germany	Better self-care behaviours adherence: Mean \pm SD EHFSBS-12: 24.7 \pm 7.8	1- Mean \pm SD age: 69 \pm 10.4 years, older 2- Self-efficacy: mean \pm SD KCCQ score 70.8 \pm 23.0, high 3- Quality of life: mean \pm SD KCCQ score 63.9 \pm 26.0, higher 4- Prosthetic heart valve n (%): 20 (6.3%) 5- Mean \pm SD number of previous cardiologist referrals: 2.2 \pm 2.0 6- Peripheral arterial disease presence n (%): 55 (17.3%)	$\beta = -0.22$ $\beta = -0.24$ $\beta = 0.16$ $\beta = -0.15$ $\beta = -0.14$ $\beta = 0.13$	$p < 0.001^{**}$ $p < 0.001^{**}$ $p = 0.009^*$ $p = 0.001^{**}$ $p = 0.021^*$ $p = 0.028^*$	$R^2 = 0.14$

19. Sedlar et al., 2021/ Slovenia	Better self-care behaviours: Mean \pm SD EHFScBS-9: 34.4 \pm 6.4	1- Mean \pm SD age: 72.4 \pm 9.5 years 2- Gender, male n (%): 46 (58) 3- Marital status unmarried n (%): 25 (31.2) 4- Education, <high school n (%): 6 (8) 5- Perceived control, mean \pm SD CAS: 16.1 \pm 3.8	OR= 0.983 OR=0.788 OR=0.762 OR=0.314 OR= 1.236	p = 0.983 p = 0.683 p = 1.229 p = 0.042* p = 0.014*	R ² = 0.19
	Interview	According to the Situation-Specific Theory of Heart Failure Self-Care, most commonly reported factors affecting the process of self-care were knowledge about HF self-care behaviours (84%), experience with healthcare professionals (84%), beliefs about their expertise (69%) and habits related to medication taking (72%). Among values, working responsibilities (53%) and maintenance of traditions (31%) appeared as the most prevalent socially based values affecting motivation for self-care. Situational characteristics related to the person (self-confidence, 53%; adaptive coping strategies, 88%), problem (burdensome breathing difficulties, 56%; co-morbidities, 81%) and environment (practical support from family/caregivers, 59%; financial difficulties, 50%) were also commonly reported.			
20.Siabani et al. 2016/ Iran	Better self-care maintenance: Mean \pm SD SCHFI-maintenance: 33.8 \pm 10.7	1- Mean \pm SD age: 66.0 \pm13.0 years, older age 2-Education: primary or higher education n (%): 97 (42%), higher 3- Median (IQR) disease duration: 36 months (12-69)	β =-3.43 β= 4.5 β=0.032	p<.001** p=0.03* p=0.09*	
	Better self-care management: Mean \pm SD SCHFI-management: 32.2 \pm 12	1- Education: primary or higher education n (%): 97 (42%), lower 2- Median (IQR) previous hospitalisations because of HF: 1 (1-2), increase 3- Social situation: Persons living alone n (%): 14 (6.1%)	β= -2.2 β= 1.4 β= 3.0	p=0.02* p=0.03* p=0.04*	

21.Son et al. 2018/ Korea	Better self-care behaviours adherence: Mean \pm SD EHFSBS-9: 31.5 \pm 5.4 <u>Adjusting for socio-demographic and clinical variable</u>	1- Mean \pm SD age: 68.7 \pm 11.1 years 2- Gender: male n (%): 171 (60.9%) 3- Educational level: high school level n (%): 107 (38.1%) 4- Employment status: unemployed n (%): 189 (67.3%) 5- Monthly income: low monthly incomes n (%): 193 (68.7%) 6- Mean \pm SD health literacy: 8.8 \pm 3.4 7- HF severity, NYHA class III n (%): 25 (8.9%) 8- Frailty: mean \pm SD FRAIL score 1.6 \pm 1.1 9- Taking diuretics status: yes n (%): 101 (35.9%)	β = 0.140 β = 0.112 β=0.20 β = 0.185 β = 0.265 β=0.14 β =- 0.112 β = 0.051 β = 0.012	p= 0.060 p= 0.066 p = 0.005* p= 0.219 p= 0.089 p = 0.029* p= 0.072 p= 0.441 p= 0.834	R ² = 0.19
22.Tawalbeh et al. 2017/ Jordan	Inadequate self-care maintenance: Mean \pm SD SCHFI-maintenance 53.9 \pm 29.8	1- Mean \pm SD age: 56.9 \pm 12.3 years 2- Gender: male n (%): 140 (61.9%) 3- Marital status: married n (%): 149 (65.9%) 4- Educational level: illiterate n (%): 67 (33.6 %), lower 5- Employment: unemployed n (%): 94 (41.6%) 6- Mean \pm SD monthly income: \$1,008.4 \pm 299.6, low 7- HF knowledge: mean \pm SD DHFKS score 5.3 \pm 3.8, lower 8- HF duration mean \pm SD duration: 5.17 \pm 2.5 9- Previous hospitalisations because of HF mean \pm SD admissions number: 4.1 \pm 2.1 10- Social situation: mean \pm SD number of people living with the patient at home: 4.2 \pm 1.6, fewer 11-Setting of the study	β =-0.16 β = 0.02 β = 0.04 β=0.13 β=-0.43 β=0.36 β=0.19 β = 0.06 β = 0.03 β=0.43 β = 0.03	p= 0.07 p= 0.76 p= 0.38 p=0 .03* p <0.001** p <0.001** p= 0.02* p= 0.12 p= 0.53 p <0.001** p= 0.10	R ² = 0.81
	Inadequate self-care management: Mean \pm SD SCHFI-management: 576 \pm 29.2	1- Mean \pm SD age: 56.9 \pm 12.3 years, older 2- Gender: male n (%): 140 (61.9%) 3-Marital status: married n (%): 149 (65.9%) 4- Educational level: illiterate n (%): 67 (33.6 %) 5- Employment: unemployed n (%): 94 (41.6%)	β=-0.38 β = -0.03 β = 0.04 β =0.05 β=-0.40	p <0.001** p= 0.96 p= 0.26 p=0 .95 p <0.001**	R ² = 0.67

		<p>6- Mean \pm SD monthly income: \$1,008.4 \pm 299.6, low</p> <p>7- HF knowledge: mean \pm SD DHFKS score 5.3 \pm 3.8, lower</p> <p>8- HF duration, mean \pm SD duration: 5.17 \pm 2.5, shorter</p> <p>9- Previous hospitalisations because of HF Mean \pm SD admissions number: 4.1 \pm 2.1</p> <p>10- Social situation, mean \pm SD number of people living with the patient at home: 4.2 \pm 1.6, fewer</p> <p>11- Setting of the study</p>	<p>$\beta=0.15$</p> <p>$\beta=0.19$</p> <p>$\beta=0.16$</p> <p>$\beta= 0.02$</p> <p>$\beta=0.46$</p> <p>$\beta= -0.06$</p>	<p>$p= 0.02^*$</p> <p>$p= 0.04^*$</p> <p>$p<.001^{**}$</p> <p>$p= 0.70$</p> <p>$p <0.001^{**}$</p> <p>$p= 0.11$</p>	
	<p>Inadequate self-care confidence:</p> <p>Mean \pm SD SCHFI-confidence 45.1 \pm 35.7</p>	<p>1- Mean \pm SD age: 56.9 \pm12.3 years, older</p> <p>2-Gender: male n (%): 140 (61.9%)</p> <p>3- Marital status: married n (%): 149 (65.9%)</p> <p>4- Educational level: illiterate n (%): 67 (33.6 %)</p> <p>5- Employment: unemployed n (%): 94 (41.6%)</p> <p>6- Mean \pm SD monthly income: \$1,008.4 \pm 299.6</p> <p>7- HF knowledge: mean \pm SD DHFKS score 5.3 \pm 3.8, lower</p> <p>8- HF duration, mean \pm SD duration: 5.17 \pm 2.5, shorter</p> <p>9- Previous hospitalisations because of HF mean \pm SD admissions number: 4.1 \pm 2.1</p> <p>10- Social situation, mean \pm SD number of people living with the patient at home: 4.2 \pm 1.6, fewer</p> <p>11- Setting of the study</p>	<p>$\beta= -0.27$</p> <p>$\beta= 0.05$</p> <p>$\beta= 0.02$</p> <p>$\beta= 0.07$</p> <p>$\beta= -0.26$</p> <p>$\beta=0.12$</p> <p>$\beta= 0.45$</p> <p>$\beta= 0.02$</p> <p>$\beta= -0.04$</p> <p>$\beta= 0.46$</p> <p>$\beta= 0.09$</p>	<p>$p=.006^*$</p> <p>$p=0.34$</p> <p>$p=0.58$</p> <p>$p=0.24$</p> <p>$p=0.004^*$</p> <p>$p=0.07$</p> <p>$p=0.01^{**}$</p> <p>$p=0.59$</p> <p>$p=0.40$</p> <p>$p<0.001^{**}$</p> <p>$p=0.31$</p>	<p>$R^2=$</p> <p>0.76</p>
23.Tung et al. 2012/ Taiwan	<p>Better self-care maintenance:</p> <p>Mean \pm SD SCHFI-maintenance = 53.9\pm19.1</p>	<p>1- Marital status: married n (%): 58 (67.4%)</p> <p>2- Mean self-care confidence (85.87)</p>	<p>$\beta=0.220$</p> <p>$\beta = 0.307$</p>	<p>$p=0.040^*$</p> <p>$p =0.004^*$</p>	<p>$R^2=$</p> <p>0.13</p>
24.Uchmanowicz et al. 2017/ Poland	<p>Inadequate self-care behaviours adherence:</p>	<p>1- Mean \pm SD age: 72.6 \pm 8.2</p> <p>2- Gender: male n (%): 132 (48.89 %)</p> <p>3- Marital status: in relationship n (%): 153 (56.67%)</p>	<p>$\beta =0.076$</p> <p>$\beta =-6.716$</p> <p>$\beta = 9.612$</p>	<p>$p=0.706$</p> <p>$p=0.012^*$</p> <p>$p=0.001^{**}$</p>	<p>$R^2=$</p> <p>0.40</p>

	Mean ± SD EHFSBS-9: 50.4 ± 25.0	<p>4- Education: high school n (%): 90 (33.33%) 4- Education: college/university n (%): 47 (17.41%) 5- Cognitive status (MMSE), no dysfunction %:(26.7%) (25.2%) moderate%, (18.9%) mild%, (29.3%) no dementia% 6- HF duration, mean ± SD duration: 6 ± 4.8 7- HF severity, NYHA class III n (%): 91 (33.7%) 7- HF severity, NYHA class IV n (%): 56 (20.7%)</p> <p>7- HF severity, Mean ± SD LVEF 44.6 ±11.7 8- Previous hospitalisations because of HF mean ± SD admissions number: 2.1 ±1.7, Increase 9- living area: urban n (%): 182 (67.4%)</p>	<p>$\beta = 5.666$ $\beta = 12.261$ $\beta = 0.918$</p> <p>$\beta = 0.31$ $\beta = -8.017$ $\beta = -13.554$ $\beta = -0.08$ $\beta = -2.958$ $\beta = -1.864$</p>	<p>$p = 0.06^*$ $p = 0.002^*$ $p = 0.009^*$</p> <p>$p = 0.284$ $p = 0.016^*$ $p = 0.004^*$ $p = 0.553$ $p = 0.001^{**}$ $p = 0.519$</p>	
25.Vaughan et al. 2013/US	Inadequate self-care maintenance: Mean ± SD SCHFI-maintenance 60.1 ±18.1	1- Mean ± SD age: 59.6 ± 15 years 2- Mean ± SD duration of HF 5.3 ± 7.0 years 3- Functional status: mean ± SD DASI score: 16.8 ± 14.3 4- Social support: Mean ± SD MSPSS score 5.3 ± 1.3		$p = 0.008^*$	$R^2 = 0.48$
	Inadequate self-care management: Mean ± SD SCHFI-management 51.2 ±19	1- Mean ± SD age: 59.6 ± 15 years 2- Mean ± SD duration of HF 5.3 ± 7.0 years 3- Functional status: mean ± SD DASI score 16.8 ± 14.3 4- Social support: mean ± SD MSPSS score 5.3 ± 1.3			
	Inadequate self-care confidence: Mean ± SD SCHFI-confidence: 52.6 ± 18.2	1- Mean ± SD age: 59.6 ±15.2 years 2- Mean ± SD duration of HF: 5.3 ± 7.0 years 3- Functional status: mean ± SD DASI score: 16.8 ± 14.3 4- Social support: mean ± SD MSPSS score 5.3±1.3		$p = 0.04^*$	$R^2 = 0.38$
	Interview	Self-care 1- The meaning of heart failure Influences self-care 2- Spirituality shapes self-care 3- Social norms drive social supports			

26. Zhang et al., 2023/ China	Better self-care maintenance: Mean \pm SD SCHFI-maintenance: 44.00 \pm 17.83	1- Educational levels, bachelor's degree n (%): 25 (12.3), 2- Monthly income, <4000 n (%): 82 40.2, higher 3- Mean \pm SD self-care confidence: 41.26 \pm24.70, better 4- HF severity, NYHA class n (%), class II: 47 (23.0), III: 108 (52.9), IV: 49 (24.0), severe 5- Mean \pm SD social support: 66.14 \pm 13.69 6- Living area, provincial capital city n (%): 66 (32.4)	β =0.091 β = 0.292, β = 0.441 β = 0.122 β =0.101 β =-0.061	 p < 0.001** p < 0.001** p = 0.034*	R ² = 0.33
	Better self-care management: Mean \pm SD SCHFI-management: 56.57 \pm 26.84	1- Gender, female n (%):86 (42.2) 2- Educational levels, bachelor's degree n (%): 25 (12.3) 3- Monthly income, <4000 n (%):82 40.2 4- Mean \pm SD self-care confidence: 41.26 \pm24.70 5- Mean \pm SD self-care maintenance: 44.00 \pm 17.83 6- Mean \pm SD IADL: 5.08 \pm 2.09, better 7- HF severity, NYHA class n (%), class II: 47 (23.0), III: 108 (52.9), IV: 49(24.0) 8- Mean \pm SD social support: 66.14 \pm 13.69 9- Living area, provincial capital city n (%): 66 (32.4)	β = 0.124 β =0.100 β =0.131 β =0.485 β =0.447 β = -0.126 β =0.054 β =0.112 β =-0.225	p = 0.012* p < 0.001** p = 0.011* p < 0.001**	R ² = 0.51
	Better self-care confidence: Mean \pm SD SCHFI-confidence: 41.26 \pm 24.70	1- Educational levels, bachelor's degree n (%): 25 (12.3), higher 2- Mean \pm SD social support: 66.14 \pm13.69, better 3- Living in more developed areas, provincial capital city n (%): 66 (32.4)	β = 0.206 β = 0.230 β = -0.137	p = 0.003** p < 0.001** p = 0.048*	R ² = 0.14

*P < 0.05; **P < 0.001

Variables in bold text demonstrated significant effect in that study

BNP: level of brain natriuretic peptide, CAS: control attitude scale, CCI: Charlson comorbidity index, COPD: chronic pulmonary obstetric Diseases, CESD: Center for Epidemiologic Studies depression scale, DASI: Duke activity status index, DHFKS: Dutch heart failure knowledge scale, DM: diabetes mellitus, EHFSBS: European heart failure self-care behaviour scale, ENRICHED: enhancing recovery in coronary heart disease, FRAIL:

fatigue, resistance, ambulation, illness, and loss of weight, HF: heart failure, IADL: instrumental activities of daily living, IQR: interquartile range, KCCQ: Kansas City cardiomyopathy questionnaire, LVEF: left ventricular ejection fraction, Max: maximum, MCI: mild cognitive impairment, Min: minimum, MMSE: mini-mental state examination, MoCA: Montreal cognitive assessment, MOS: medical outcomes study social support survey, MSPSS: multidimensional scale of perceived social support, n: number, NYHA: NYHA New York heart association, PHQ: patient health questionnaire, PHQ-9: patient health questionnaire depression severity score, SCHFI: self-care of failure heart index, SD: standard deviation, US: United States

2.10.3 Factors Affecting Self-Care Adherence

2.10.3.1 Personal Factors

Age

Participants' age was examined as a predictive factor of self-care adherence in fourteen studies (Table 5). It was examined in relation to self-care maintenance in five studies, three of which demonstrated conflicting statistically significant associations: older age was predictive of inadequate self-care maintenance in sample sizes of $n = 231$ (Siabani et al., 2016) and 1192 (Cocchieri et al., 2015), whereas older age was predictive of better self-care maintenance in a smaller sample of $n=50$, aged 45 years or older (Cameron et al., 2009). Other studies found no significant association (with a larger sample size of $n = 236$ and $n=245$) (Aljohani, 2023; Tawalbeh et al., 2017). There was no clear association of findings with sample average age, with study participants ranging from mean \pm SD age of 56.92 ± 12.29 years (Tawalbeh et al., 2017) 56.51 ± 9.70 (Aljohani, 2023) and 66.0 ± 13.0 years (Siabani et al., 2016), to 72.36 ± 11.2 years (Cocchieri et al., 2015) and 73 ± 11 years (Cameron et al., 2009).

In terms of self-care management, the impact of age was assessed in four studies (Aljohani, 2023; Cameron et al., 2009; Davis et al., 2015; Tawalbeh et al., 2017), in two of which levels of self-care management were significantly less adequate at older ages (Davis et al. (2015); Tawalbeh et al. (2017)). In these two studies, the mean ages of participants were 59 ± 13 and 56.92 ± 12.29 years. No significant association was demonstrated in the third study from Cameron et al. (2009), which recruited much older patients with the mean age of 73 ± 11 years. and a fourth study which recruited participants of similar age: 56.51 ± 9.70 years (Aljohani, 2023).

Three studies examined the relationship and found older age significantly linked to inadequate self-care confidence (Cocchieri et al., 2015; Davis et al., 2015; Tawalbeh et al., 2017).

One study only used correlation coefficients in a small sample of $n=30$ HF patients in the US, finding no association between self-care practices (maintenance, management and confidence) and patients' age (Vaughan et al., 2013).

Seven studies examined the effect of age on self-care behaviours (Gallagher et al., 2011; Liu et al., 2014; Muller-Tasch et al., 2018; Ok & Choi, 2015; Peters-Klimm et al., 2013; Sedlar et al., 2021; Uchmanowicz et al., 2017); five used the 12-item version of the EHFSBS and two used the 9-item version of the same tool (Uchmanowicz et al. (2017); Sedlar et al. (2021)). Four of these

seven studies showed significant associations, with older people more likely to adhere to self-care behaviours (in sample sizes ranging from n=141 to 318 from Taiwan, Korea and Germany), while no significant association was found in studies with similar sample sizes (n=80 from Slovenia (Sedlar et al., 2021); n=333 from the Netherlands (Gallagher et al., 2011) and n=270 from Poland (Uchmanowicz et al., 2017)). The four studies with significant findings reported the mean age of their study participant groups as 68 years (Liu et al., 2014), 63.6 years (Muller-Tasch et al., 2018), 59.5 years (Ok & Choi, 2015) and 69 years (Peters-Klimm et al., 2013), whereas the participant groups of the studies with non-significant findings were older, with mean ages 72 years (Gallagher et al., 2011), 72.4 years (Sedlar et al., 2021) and 72.6 years (Uchmanowicz et al., 2017).

In summary, for the four categories of self-care adherence (self-care maintenance, management, confidence and behaviours) examined in fourteen studies, age showed inconsistent findings. In three of five studies that examined the association of age and self-care maintenance, older age, typically those in their 60s or 70s rather than 50s, was a determinant of inadequate self-care maintenance in two studies, whereas older age was a determinant of better self-care maintenance in one study. Older age, those in their 50s or 60s rather than 70s, was a determinant of inadequate self-care management in two of three studies and inadequate self-care confidence in all three studies that examined this. Nevertheless, older age, typically in their 50s or 60s rather than 70s, was a determinant of better self-care behaviours in four of seven studies (see Table 5).

Gender

Links between gender and self-care adherence were investigated in twelve studies (Table 5). It was investigated as a predictive factor for self-care maintenance in six and for self-care management in seven studies. One large Italian study (n=1192, 58% male) demonstrated males more likely to report inadequate self-care maintenance than females (Cocchieri et al., 2015). However, results were inconsistent, with no significant association found in the remaining studies, recruiting much smaller numbers: n=50 to n=245 (Aljohani, 2023; Cameron et al., 2009; Davis et al., 2015; Graven et al., 2019; Tawalbeh et al., 2017). In terms of self-care management in these seven studies, one study (58% male) revealed significantly less adequate self-care management scores among males (Cocchieri et al., 2015); this was consistent with Zhang et al. (2023) from China (57.8%), while another study (76% male) revealed significantly less adequate

self-care management scores among females (Cameron et al., 2009). The remaining three studies showed no significant association despite similar male percentages (56.5% (Aljohani, 2023), 53% (Davis et al., 2015), 54.2% (Graven et al., 2019), 61.90% (Tawalbeh et al., 2017)).

Links between self-care confidence and various factors were examined in four studies, but the findings were inconsistent. Graven et al. (2019) reported significantly higher self-care confidence scores in males, whereas Cocchieri et al. (2015) found significantly lower confidence among male participants. Two other studies found no significant association between gender and self-care confidence (Davis et al., 2015; Tawalbeh et al., 2017).

Six studies evaluated self-care behaviour (Gallagher et al., 2011; Muller-Tasch et al., 2018; Ok & Choi, 2015; Sedlar et al., 2021; Son et al., 2018; Uchmanowicz et al., 2017), with only one study (Uchmanowicz et al., 2017) finding significant association between gender and self-care behaviour, where male gender was associated with less adequate EHFSBS scores. There was no difference between these studies in terms of study design or sample size, but one study (Uchmanowicz et al., 2017) recruited 48.9% male participants, while in studies with non-significant findings, many more participants were male, at 65 % to 74%.

In summary, for the four categories of self-care adherence examined in twelve studies, male gender was associated with inadequate self-care maintenance in one of six studies, with conflicting findings of gender effects on self-care management in three of seven studies (two studies showed male gender as a determinant of inadequate self-care management and one study showed male gender as a determinant of better self-care management). There were also conflicting findings for self-care confidence in two of four studies (one study each showed male gender as a determinant of inadequate and better self-care confidence) and male gender predicted inadequate self-care behaviours in one of five studies (see Table 5).

Marital Status

An analysis of participants' social and residential characteristics showed that individuals who were single demonstrated significantly lower levels of self-care maintenance and self-care confidence (Tung et al., 2012), and highly significantly inadequate self-care behaviours (Alkouri et al., 2022; Muller-Tasch et al., 2018; Uchmanowicz et al., 2017) but no association with self-care adherence and marital status (Getachew et al., 2022; Sedlar et al., 2021). However, while married patients demonstrated significantly less adequate self-care behaviours (Ok & Choi,

2015), no significant association was found between marital status and self-care maintenance, management and confidence by Tawalbeh et al. (2017).

Education

Education was investigated in relation to self-care in eleven studies (Table 5). Of five studies, in two studies carried out in Iran and Jordan, inadequate self-care maintenance was significantly predicted by lower educational level (Siabani et al., 2016; Tawalbeh et al., 2017). In these studies, 49% (Siabani et al., 2016) and 79% (Tawalbeh et al., 2017) of the participants were illiterate or had not progressed to higher education. However, three studies found no association between self-care maintenance and education (Aljohani, 2023; Gomes da Silva et al., 2023; Zhang et al., 2023). Education was examined as an indicator of self-care management in five studies, in two of which patients with less than a high school diploma had significantly less adequate self-care management (Davis et al., 2015; Siabani et al., 2016), and no significant association was found in three other studies (Aljohani, 2023; Tawalbeh et al., 2017; Zhang et al., 2023). Links with self-care confidence were examined in three studies; one study showed that inadequate self-care confidence was associated with lower educational level (Zhang et al., 2023), with the other studies showing no significant effect (Gomes da Silva et al., 2023; Tawalbeh et al., 2017). Three of five studies found that those with lower educational levels engaged significantly less in self-care behaviours (examined using the 9-item EHFSBS (Sedlar et al., 2021; Son et al., 2018; Uchmanowicz et al., 2017)). However, the other two studies (using the 12-item EHFSBS) found no association (Muller-Tasch et al. (2018); Gallagher et al. (2011)).

In summary, for the four categories of self-care adherence examined in eleven studies, lower educational level was a determinant of: inadequate self-care maintenance in two of the five studies that examined this; inadequate self-care management in two of the five studies to assess this; inadequate self-care confidence in one of the three studies to assess this; and inadequate self-care behaviours in three of five studies (see Table 5).

Employment Status

Six studies examined employment status as a determinant of self-care, with 41.6% (Aljohani, 2023), 82.0% (Cocchieri et al. (2015), 56.9% (Kato et al. 2009), 65% (Massouh et al., 2020), 55.7% (Ok & Choi 2015) and 41.6% (Tawalbeh et al. (2017) of participants unemployed. Employment was examined in relation to self-care maintenance in three studies (Aljohani, 2023; Cocchieri et

al., 2015; Tawalbeh et al., 2017), to self-care management in two studies (Cocchieri et al., 2015; Tawalbeh et al., 2017) and self-care confidence in three studies (Cocchieri et al., 2015; Massouh et al., 2020; Tawalbeh et al., 2017). Unemployment predicted inadequate self-care maintenance, management and self-care confidence in one study (Tawalbeh et al., 2017). Unemployment also predicted inadequate self-care management in the study by Cocchieri et al. (2015), but not self-care maintenance or confidence. However, being unemployed was also associated with better self-care confidence (Massouh et al., 2020). Moreover, employment status was examined as a predictive factor of self-care behaviour in two studies, with being unemployed shown as independently predictive of better adherence to self-care behaviour by Kato et al. (2009) but not by Ok and Choi (2015).

In summary, for the four categories of self-care adherence examined in six studies, unemployment was a determinant of inadequate self-care maintenance in one of three studies, inadequate self-care management in two of three that examined it, and better self-care behaviours in one of the two studies that explored this. There were also conflicting findings for self-care confidence: being unemployed was associated with inadequate self-care confidence in one study, better self-care confidence in one study, and no association in the third study that assessed this (see Table 5).

Income

Three studies examined economic factors, considering monthly income in relation to self-care maintenance and self-care management (Gomes da Silva et al., 2023; Tawalbeh et al., 2017; Zhang et al., 2023). One study recruited n=236 patients in Jordan and revealed low income as a strong predictor of inadequate self-care maintenance and management (Tawalbeh et al., 2017); where participants' monthly income ranged from \$420–\$1,008.42, Zhang et al. (2023) revealed lower monthly income was a significant predictor of inadequate self-care maintenance, but there was no association with self-care management. The association between family incomes and self-care confidence was examined in two studies (Gomes da Silva et al., 2023; Tawalbeh et al., 2017), with one study revealing that participants with a lower family income were more likely to have inadequate self-care confidence (Gomes da Silva et al., 2023). Moreover, financial difficulties reported by half of the participants impacted their ability to engage in self-care behaviours (Sedlar et al., 2021) (see Table 5).

In summary, for the three categories of self-care adherence examined in three studies, low income was a strong predictor of inadequate self-care maintenance in the two studies that explored this and inadequate self-care management and self-care confidence in one each of two studies.

Race and Ethnicity

Race and ethnicity were investigated as predictive factors for self-care in three studies, two from the US (Davis et al., 2015; Graven et al., 2019) and one from Brazil (Gomes da Silva et al., 2023). In Graven et al.'s (2019) study, recruiting n=107 HF patients, 44% Caucasian, and 56% non-Caucasian (54.2% African American; 0.9% Hispanic; 0.9% other), Caucasian race was significantly associated with lower self-care management but not self-care confidence or self-care maintenance. By contrast, Davis et al. (2015), who recruited n=125 HF patients (67% black non-Hispanic, 31% White and 2% other), found that non-black patients had significantly higher self-care maintenance scores than black participants. Gomes da Silva et al. (2023) recruited n=405 participants (mixed (Caucasian + African American) 36.0%, Caucasian 35.1%, African American 28.4%, and Asian 0.5%) and found no association between self-care confidence and race.

In summary, three studies with differing ethnic groups of non-Caucasian participants (including African American, Hispanic, Asian and mixed ethnicities) reported contradictory findings on links between black versus white ethnicity and self-care management and maintenance (see Table 5).

HF Knowledge and Health Literacy

HF knowledge refers to any information about HF self-care that a person can interpret and retrieve from memory and previously learned materials, the meaning of which the person is able to explain when needed. HF knowledge was assessed as a determinant of self-care maintenance in four studies (Al-Hammouri et al., 2020; Davis et al., 2015; Massouh et al., 2020; Tawalbeh et al., 2017), in terms of self-care management in two studies (Massouh et al., 2020; Tawalbeh et al., 2017), in terms of self-care confidence in three studies (Al-Hammouri et al., 2020; Massouh et al., 2020; Tawalbeh et al., 2017), and in terms of self-care behaviours (assessed using the EHFSBS-12) in three studies (Kato et al., 2009; Liu et al., 2014; Ok & Choi, 2015). Lower knowledge about HF was strongly determinant of inadequate self-care maintenance in all four studies that examined this. Two included n=236, and n=245 patients with HF with no diagnosis of cognitive

or psychiatric impairments in Jordan (Al-Hammouri et al., 2020; Tawalbeh et al., 2017); one included n=100 with HF with no diagnosis of cognitive or psychiatric impairments in Lebanon (Massouh et al., 2020) while the other study included n=125 HF patients with mild cognitive impairment in the US (Davis et al 2015). Lower HF knowledge was a determinant of inadequate self-care management (Tawalbeh et al., 2017) but there was no association found in the other study (Massouh et al., 2020). Lower HF knowledge was a determinant of inadequate self-care confidence in two of three studies that examined it (Massouh et al., 2020; Tawalbeh et al., 2017). Inadequate adherence to self-care behaviours was associated with lower heart failure knowledge in two out of three studies investigating this relationship. One study involved 141 patients in Taiwan (Liu et al., 2014), and the other included 280 patients in Korea (Ok & Choi, 2015). Knowledge about HF was not a predictor of self-care adherence in a study from Japan (Kato et al., 2009), but this last study used the heart failure knowledge scale while the other four studies used the Dutch heart failure knowledge scale.

In a qualitative study, knowledge was mentioned as an enabler of self-care practices (Clark et al., 2009). Patients and caregivers reported that their knowledge of the nature and causes of HF was inadequate and they tended to attribute the common HF symptoms to other causes, such as cold or smoking, resulting in ineffective therapeutic and behavioural management (Clark et al., 2009). In addition, in their mixed methods study, Sedlar et al. (2021) highlighted the importance of having adequate knowledge about HF to effectively engage in self-care practices, reported by around eighty-four percent of their participants. Knowledge deficiencies related to topics such as how much they should drink, how much liquid different foods contain, why daily weight measurement is important, and when to seek professional care. One study investigated health literacy and self-care behaviours and reported that inadequate health literacy predisposed patients to inadequate self-care behaviours (Son et al., 2018).

In summary, in seven studies, lower knowledge was a determinant of inadequate self-care maintenance in all four studies assessing this; of inadequate self-care management in one study of two studies that examined this; of inadequate self-care confidence in two of three studies that explored this; and of inadequate self-care behaviours in two of three studies. In addition, inadequate health literacy predisposed patients to inadequate self-care behaviours in the sole study that assessed this (see Table 5).

Self-care Confidence, Self-efficacy, Perceived Control and Health Locus of Control

Cognitive constructs refer to patients' personal beliefs about their ability to complete tasks or have the power to control their life. Constructs including self-care confidence, self-efficacy, perceived control and health locus of control have been examined as determinants of HF self-care.

Self-care confidence was evaluated in relation to self-care maintenance in six studies and self-care management in four studies. Lower self-care confidence was a significant predictor of worse self-care maintenance in five studies (Al-Hammouri et al., 2020; Aljohani, 2023; Massouh et al., 2020; Tung et al., 2012; Zhang et al., 2023). One study by Cameron et al. (2009) found no association between self-care confidence and self-care maintenance. Lower self-care confidence was a significant predictor of worse self-care management in all four studies that examined it (Aljohani, 2023; Cameron et al., 2009; Massouh et al., 2020; Zhang et al., 2023). Self-confidence and the ability to adapt were reported frequently by participants to be related to self-care adherence (Sedlar et al., 2021).

Self-efficacy was examined in relation to self-care behaviours in one study; lower levels of self-efficacy, assessed with the German version of the Kansas City cardiomyopathy questionnaire, were associated with inadequate self-care adherence assessed using the EHFSBS-12 (Peters-Klimm et al., 2013).

Perceived control, measured by the control attitude scale-revised, was examined in terms of self-care maintenance and self-care management in one study and found to significantly predict both in patients with HF without mild cognitive impairment (Lee et al., 2019). Low perceived control over their heart condition predicted lower participation in self-care in patients with HF (Lee et al., 2019). Perceived control, assessed using a four-item control attitude scale (CAS) to examine the association with self-care behaviours showed significant influence of perceived control on EHFSBS-9 (Sedlar et al., 2021). Health locus of control was examined in one study but not found to be linked with adherence to self-care behaviours measured using the EHFSBS-12 (Kato et al., 2009).

In summary, for the four categories of self-care adherence examined in four studies, analyses linked attitudinal characteristics with inadequate self-care adherence. Lower self-care confidence was a determinant of inadequate self-care maintenance in five of six studies that

examined this, and of inadequate self-care management in all four studies to explore this. In one study each, lower levels of self-efficacy determined inadequate self-care adherence, and lower perceived control was a determinant of inadequate self-care maintenance and self-care management. Lower perceived control was a determinant of inadequate self-care behaviours in one study. Health locus of control was examined in only one study, which did not show a significant relationship with self-care behaviours (see Table 5).

Cultural Identity, Norms and Values

In the qualitative component of a mixed-methods study conducted with n=30 HF patients from an ethnic minority black population in the US, Vaughan et al. (2013) revealed that cultural beliefs influenced how patients engaged in both self-care maintenance and self-care management (Vaughan et al., 2013). In terms of self-care maintenance, adherence to medication was supported by cultural norms which viewed HF medications as essential to prolong life or survival. However, most patients reported difficulty in reconciling a low-salt diet with culturally highly influential foods. A low-salt diet was not recognised as essential to self-care in HF, with participants not recognising the link between diet and HF symptoms or disease deterioration. Likewise, with self-care management, common HF symptoms were believed to be linked to stress and expected to be managed by reducing or tolerating the stress rather than monitoring the symptoms and daily weights (Vaughan et al., 2013).

Values linked to culture, history, and place were described as influencing self-care in a Canadian qualitative study with n=42 HF patients and n=30 caregivers. For example, patients tended to avoid seeking professional care for as long as possible, especially those who lived in rural areas. As a result, they experienced severe symptoms at the point when they sought help from a health professional, which was attributed to a lack of knowledge about HF by patients and their caregivers. Moreover, attitudes towards health professionals and services determined self-care, where the majority of patients in this study preferred to cede management responsibility to their healthcare professionals. The majority of patients expressed a 'blind' or strong faith in their physicians to make decisions on their behalf and would follow professional advice regarding self-care without seeking or attaining knowledge of HF or the rationale for self-care. Where daily activities were seen as unavoidable, such as gardening or in the home, any flare-ups of symptoms had to be tolerated without complaint (Clark et al., 2009). Sedlar et al. (2021) emphasise that the majority of participants reported the pivotal role of their interactions

with healthcare professionals and their beliefs regarding the expertise of these professionals, indicating a profound influence on their self-care decisions. The impact of their habits related to medication intake was noted, such as the adoption of structured medication schedules, which integrated seamlessly into their daily routines. Beliefs about healthcare professionals and medication adherence were likely to be reinforced through such practices.

In summary, self-care adherence was influenced by values and beliefs linked to culture, history, and place, including attitudes about health professionals and services (see Table 5).

Spirituality and Religious Beliefs

In the qualitative component of the mixed methods study (Vaughan et al., 2013), self-care practices were revealed as shaped by spiritual beliefs. Most HF patients used prayers to direct actions, believing that God's will provided all that was needed. Others, described as equally religious, saw self-care as listening to advice and doing what a healthcare professional advised (Vaughan et al., 2013) (see Table 5).

Quality of Life, Feelings about Disease, Impulsivity and Perceived Stress

One study investigated the relationship between perceived quality of life (measured by the German version of the Short Form 36 Health Survey) and self-care behaviours (via the EHFS CBS-12) and found that a higher perceived health-related quality of life was independently associated with inadequate self-care adherence (Peters-Klimm et al., 2013). Feelings about their disease were assessed in relation to self-care maintenance in one study, which showed that patients with positive or neutral feelings towards the disease had greater chances of increased self-care maintenance (Gomes da Silva et al., 2023). Al-Hammouri et al. (2020) examined the association of perceived stress and impulsivity with self-care maintenance and confidence and found that these factors were associated with inadequate self-care maintenance. Furthermore, the findings indicated that self-care confidence and impulsivity play significant roles in predicting self-care maintenance and that self-care confidence acts as a mediator between impulsivity and self-care maintenance, particularly when perceived stress levels are lower, but this mediation effect diminishes at higher levels of perceived stress.

Smoking and Lifestyle

Smoking was examined in relation to self-care maintenance and confidence and not found significant (Gomes da Silva et al., 2023) (see Table 5). In addition, Gomes da Silva et al. (2023) looked at the relationship of sedentary lifestyle and revealed that sedentary patients had inadequate self-care confidence but not maintenance.

2.10.3.2 Problem or Disease-Related Factors

Cognitive and Executive Function

Associations between cognitive and executive function and self-care were examined in five studies. Cognitive function was assessed in relation to self-care maintenance in three studies (Cameron et al., 2009; Cocchieri et al., 2015; Gomes da Silva et al., 2023), in relation to self-care management in two studies (Cameron et al., 2009; Cocchieri et al., 2015), in relation to self-care confidence in three studies (Cameron et al., 2009; Cocchieri et al., 2015; Gomes da Silva et al., 2023), and in relation to self-care behaviours in one study (Uchmanowicz et al., 2017). Cognitive function was scored using the Mini-Mental State Examination (MMSE) in all studies except that of Gomes da Silva et al. (2023), which used the Montreal Cognitive Assessment (MoCA). Lower cognitive function significantly contributed to inadequate self-care behaviour (EHFScBS-9 scores) (Uchmanowicz et al., 2017) and was highly significantly predictive of inadequate self-care maintenance, management and confidence (Cocchieri et al., 2015). However, Cameron et al. (2009) found that adding cognitive function as a variable improved the model in predicting self-care maintenance and self-care management but was not independently predictive. There was no association found with self-care maintenance and confidence (Gomes da Silva et al., 2023).

Executive function was evaluated as a predictive factor of self-care management in one study; lower levels of the composite scores of executive function predicted worse self-care management in HF patients with mild cognitive impairment (Lee et al., 2019).

In summary, cognitive function was a determinant of inadequate self-care adherence in four studies; lower cognitive function was a determinant of inadequate self-care maintenance and management in one of three studies; inadequate self-care confidence in one of two studies; and inadequate self-care behaviours in the single study that examined this. Lower executive function was associated with inadequate self-care management in the single study that examined this (see Table 5).

HF Duration

The time since HF diagnosis was evaluated in relation to self-care adherence in five studies. It was considered in relation to self-care maintenance in five studies (Aljohani, 2023; Cocchieri et al., 2015; Siabani et al., 2016; Tawalbeh et al., 2017; Vaughan et al., 2013); in relation to self-care management in three studies (Aljohani, 2023; Tawalbeh et al., 2017; Vaughan et al., 2013); and in relation to self-care confidence in two studies (Tawalbeh et al., 2017; Vaughan et al., 2013); and in relation to self-care behaviour in one study (Uchmanowicz et al., 2017). Inadequate self-care maintenance was significantly associated with shorter time since diagnosis in two studies (Cocchieri et al., 2015; Siabani et al., 2016), while no significant association was seen in the other study (Tawalbeh et al., 2017). Shorter duration of disease was shown to be highly significantly predictive of lower self-care management but not self-care confidence (Tawalbeh et al., 2017). Neither was disease duration related to self-care behaviours (EHFScBS-9 scores; (Uchmanowicz et al., 2017), self-care maintenance or management scores (Aljohani, 2023; Vaughan et al., 2013).

In summary, shorter HF duration was linked with inadequate self-care maintenance in two of five studies and with inadequate self-care management in one of three studies that examined this but had no association with self-care behaviours and confidence (see Table 5).

Acute Healthcare Services

The number of previous cardiologist referrals and hospital readmissions were examined in several studies. Referrals to cardiologists in the preceding year were examined in one study, with fewer referrals associated with inadequate overall self-care adherence (Peters-Klimm et al., 2013). Numbers of previous hospital admissions in the preceding year were examined in three studies for each SCHFI subscale: in terms of self-care maintenance (Aljohani, 2023; Gomes da Silva et al., 2023; Zhang et al., 2023); in terms of self-care management (Aljohani, 2023; Siabani et al., 2016; Tawalbeh et al., 2017); in terms of self-care confidence (Gomes da Silva et al., 2023; Massouh et al., 2020; Tawalbeh et al., 2017); and in four studies in terms of self-care behaviours (Gallagher et al., 2011; Getachew et al., 2022; Kato et al., 2009; Uchmanowicz et al., 2017). Not having experienced recent hospitalisation was associated with better self-care confidence (Massouh et al., 2020). Although greater numbers of hospital admissions were statistically significantly associated with better self-care management (Siabani et al., 2016), each increasing

hospitalisation was associated with inadequate self-care confidence (Gomes da Silva et al., 2023) and with inadequate self-care behaviours using EHFScBS-9 scores (Uchmanowicz et al., 2017). No association was seen with self-care maintenance, management or confidence in the studies by Aljohani (2023); Massouh et al. (2020); Tawalbeh et al. (2017); Zhang et al. (2023), or with EHFScBS-12 scores (Gallagher et al., 2011; Getachew et al., 2022; Kato et al., 2009).

In summary, increasing numbers of hospital admissions were linked with inadequate self-care behaviours in one of four studies, with inadequate self-care confidence in one of two studies, but with better self-care management in one of three studies. No recent hospitalisation was associated with better self-care confidence in one study. Fewer cardiology referrals were linked to inadequate self-care behaviours and worse self-care maintenance and confidence in one study (see Table 5).

Symptom Severity

Across the studies, between 8.9% (Son et al., 2018) to 93% of participants (Gallagher et al., 2011) were categorised as NYHA class III or IV. In most studies, around half the sample was categorised as NYHA class III or IV (Table 2). HF severity or functional limitation was examined as a determinant of self-care in thirteen studies. Self-care maintenance was examined in four studies (Davis et al., 2015; Gomes da Silva et al., 2023; Massouh et al., 2020; Zhang et al., 2023); self-care management in three studies (Cocchieri et al., 2015; Davis et al., 2015; Zhang et al., 2023); self-care confidence in one study (Gomes da Silva et al., 2023). Severe NYHA classification was a significant predictor of better self-care maintenance (Davis et al., 2015; Zhang et al., 2023), while Massouh et al. (2020) reported that HF patients with lower NYHA scores (class I or II versus III or IV) had significantly better self-care maintenance, and Gomes da Silva et al. (2023) revealed that increasing LVEF scores were associated with better self-care maintenance. Severe NYHA classification, greater symptom severity, or greater functional compromise made the largest contributions to better self-care management (Davis et al., 2015). However, Cocchieri et al. (2015) found having severe NYHA class predicted inadequate self-care management, while no association was found by Zhang et al. (2023). Related to self-care confidence, Gomes da Silva et al. (2023) found each unit increase in LVEF was associated with better self-care confidence. Functional status, scored as the instrumental activities of daily living (IADL) scale, was examined in relation to self-care management and it was found that better IADL predicted better self-care management (Zhang et al., 2023). No associations were found between functional status using

the Duke activity status index (DASI) with self-care maintenance or management or confidence using correlation analysis in a mixed-method study (Vaughan et al., 2013).

NYHA class was examined in relation to self-care behaviours in seven studies (Gallagher et al., 2011; Getachew et al., 2022; Kato et al., 2009; Muller-Tasch et al., 2018; Ok & Choi, 2015; Son et al., 2018; Uchmanowicz et al., 2017). Uchmanowicz et al. (2017) reported that HF patients with higher NYHA scores (class III or IV versus I or II) had significantly less adequate self-care behaviours as EHfScBS-9 scores, but NYHA class was not associated with self-care behaviours in six other studies. Ok and Choi (2015) evaluated participants' functional status using the DASI and found that patients with better functional status had significantly less adequate self-care behaviours (EHfScBS-12 scores).

In summary, for the four categories of self-care adherence examined in thirteen studies, conflicting findings were found. Greater HF severity (NYHA class) was statistically significantly associated with better self-care maintenance in the two of three studies; with inadequate self-care maintenance in the third study that examined this; with inadequate, better, and no association with self-care management in three studies that explored this, and with inadequate self-care behaviours in one of seven studies that addressed this. An increased LVEF score was associated with better self-care maintenance and confidence in the sole study that assessed this. In addition, higher functional status predicted inadequate self-care behaviours in one study, but no association was seen with any SCHFI subscale (see Table 5).

Co-morbidity and Frailty

Ten studies examined the relationship of severity of comorbidity using the Charlson comorbidity index (CCI) or having comorbid conditions such as diabetes mellitus (DM), peripheral arterial disease (PAD), arterial hypertension, chronic kidney disease (CKD), dyslipidaemia, obesity, sleep apnoea, chronic obstructive pulmonary disease (COPD), insomnia, anxiety and frailty. The severity of comorbidity scored using the CCI was assessed as a determinant of self-care maintenance and management in one study (Cameron et al., 2009). Overall, moderate-to-severe levels of comorbidity were strongly predictive of greater self-care maintenance and management in HF patients (Cameron et al., 2009). Gomes da Silva et al. (2023) assessed the relationship of hypertension, CKD, dyslipidaemia and obesity with self-care maintenance and confidence, revealing that obesity was associated with inadequate self-care maintenance,

whereas having dialytic renal failure was associated with better self-care maintenance. No association was found between hypertension or dyslipidaemia with self-care maintenance or for all four conditions with self-care confidence. Gomes da Silva et al. (2023) also assessed the relationship of sleep apnoea and COPD with self-care management, revealing that having sleep apnoea was associated with better self-care management, but no association was found with COPD.

The association of any comorbidity with HF was examined for DM in three studies and for PAD, anxiety and insomnia as predisposing factors for self-care behaviours in one study each. Determinants of inadequate adherence to self-care behaviours were identified as DM (Kato et al., 2009) and PAD (Peters-Klimm et al., 2013), whereas insomnia was a determinant of better adherence to self-care behaviours (Alkouri et al., 2022). However, three studies found no significant associations between self-care behaviours and any comorbidities (DM or COPD (Gallagher et al., 2011) or DM (Alkouri et al., 2022) or anxiety, as measured by the PHQ-9 (Muller-Tasch et al., 2018)). Sedlar et al. (2021) reported that around 81% of participants talked about the significance of having comorbid conditions with HF in shaping their self-care practices. Frailty was also examined as a predictive factor of self-care in one study, using the Korean version of the FRAIL scale (fatigue, resistance, ambulation, illness, and loss of weight) to assess disability (Kan et al., 2008). In this study, frailty was not a significant determinant of self-care behaviours (Son et al., 2018).

Having depression was examined in related to self-care maintenance in two studies, with self-care management and confidence in one study each. Depressive symptoms were linked with inadequate self-care management but not self-care maintenance (Cameron et al., 2009) or self-care maintenance or confidence (Al-Hammouri et al., 2020). Depression was also examined as a predisposing factor for self-care behaviours in three studies (Gallagher et al., 2011; Getachew et al., 2022; Muller-Tasch et al., 2018). Depression severity scores significantly independently predicted inadequate self-care behaviours (Getachew et al., 2022), while no significant association was found between depression and self-care behaviours in other studies. Depression was scored using the Patient Health Questionnaire (PHQ-9) (Al-Hammouri et al., 2020; Getachew et al., 2022; Muller-Tasch et al., 2018), the Cardiac Depression Scale (Cameron et al., 2009), and the Centre for Epidemiological Studies Depression scale (CESD) (Gallagher et al., 2011).

In summary, the presence of co-morbid conditions was a significant determinant of better self-care maintenance and management in one study. Presence of obesity was associated with inadequate self-care maintenance, whereas having dialytic renal failure was associated with better self-care maintenance, but neither condition was not associated with self-care confidence. Neither hypertension nor dyslipidaemia was associated with self-care maintenance or confidence in the one study that examined this. Better self-care management was associated with sleep apnoea, but not COPD in the one study that examined this. Moreover, the presence of DM was predictive of inadequate self-care behaviours in one of three studies that examined this. The presence of PAD was predictive of inadequate self-care behaviours, while having insomnia was predictive of better self-care behaviours in one study each that examined this. However, there was no significant association of COPD or anxiety with self-care behaviours in the one study that examined each condition. However, the presence of depressive symptoms was a significant predictor of inadequate self-care management in one of two studies and of inadequate self-care behaviours in one of three studies (see Table 5).

Treatment and Number and Class of Medications

Two studies examined the association of the number of medications taken per day with self-care maintenance and confidence (Cocchieri et al., 2015; Gomes da Silva et al., 2023) and found that fewer medications were significantly associated with inadequate self-care maintenance and confidence (Cocchieri et al., 2015). Gomes da Silva et al. (2023) reported that each additional prescribed medication was significantly associated with greater inadequate self-care confidence, but no association was found with self-care maintenance.

In terms of treatment, one study examined the association of the presence of a prosthetic heart valve with self-care behaviours and found it was associated with better overall self-care behaviours (Peters-Klimm et al., 2013). Medication classes were also examined in relation to self-care behaviours in two studies, finding that patients with HF who were taking a beta blocker and/or digitalis had inadequate self-care behaviours (Getachew et al., 2022). Another study revealed that treatment with diuretics was not associated with self-care behaviours (Son et al., 2018) (see Table 5).

2.10.3.3 Environmental Factors

Social Support

Social support was examined in relation to self-care adherence across eight studies. Specifically, it was assessed in relation to self-care maintenance in five studies, self-care confidence in four studies, and self-care behaviours in three studies. Patients with HF who had low levels of social support reported significantly inadequate self-care behaviours (Gallagher et al., 2011; Getachew et al., 2022; Ok & Choi, 2015); inadequate self-care maintenance (Davis et al., 2015; Lee et al., 2019; Massouh et al., 2020); and inadequate confidence levels (Davis et al., 2015; Zhang et al., 2023). Zhang et al. (2023) indicated that patients with HF with lower social support presented with inadequate self-care confidence, which subsequently resulted in inadequate self-care maintenance. In the quantitative component of a mixed-method study, Vaughan et al. (2013) found significant bivariate correlations between lower social support with worse self-care maintenance and self-care confidence. In the qualitative component of the same study, most patients reported that social support and related social norms played a crucial role in daily self-care practices. Patients with HF described levels of both concrete and emotional social support. With tangible support defined as the provision of direct physical assistance such as material goods, money, or useful services (Elkhalifa et al., 2020), the family provided tangible support to improve patients' self-care maintenance and management, which included assistance with activities of daily living such as preparing low-salt meals and financing medicines. Limited emotional support was reported, usually influenced by social norms that prevented them from seeking help. The majority of patients reported experiencing social isolation as the result of their disease, which was exacerbated by their reluctance to seek support as they became unable to continue participating in social and cultural activities.

In summary, with eight studies examining the role of social support, overall lower social support was significantly associated with inadequate self-care maintenance, self-care confidence and self-care behaviours (see Table 5).

Social Situation

In seven studies, the domestic social situation was examined in terms of who lived with participants and who looked after them, the number of people at home, and marital status. Fewer people living with participants was highly significantly predictive of inadequate self-care

maintenance, self-care management, and self-care confidence (Tawalbeh et al., 2017), although having a caregiver was a highly significant determinant of inadequate self-care maintenance (Cocchieri et al., 2015). Each extra child was associated with less adequate self-care maintenance and participants with married children were more likely to have inadequate self-care management (Gomes da Silva et al., 2023). Patients living with children and others compared to those living alone or with only a spouse had significantly lower levels of self-care management (Siabani et al., 2016). Nonetheless, no associations were found between self-care maintenance, self-care management and living with support (Cameron et al., 2009) or number of family members (Aljohani, 2023). However, during the interviews, approximately 59% of participants reported the presence of practical support from family or caregivers to help patients with HF adhere to self-care practices (Sedlar et al., 2021).

In summary, with seven studies examining the role of living circumstances on self-care adherence score, overall, sharing a home with more people predicted better self-care scores. Inconsistent results were reported for having a caregiver and presence of children, with having married children linked to inadequate self-care maintenance and management (see Table 5).

Area Lived

Zhang et al. (2023) examined the role of domiciliary location in relation to SCHFI subscales and found living in more developed areas to be significantly predictive of better self-care management and confidence. No significant association was found in a previous study related to study location (Tawalbeh et al., 2017).

2.10.4 Facilitators and Barriers to Self-Care Behaviours Among Patients with HF

Only one study identified facilitators and barriers that affected self-care behaviours among HF patients, using semi-structured interviews (Sedlar et al., 2021). Most self-care behaviours revealed by participants, such as weight monitoring, fluid and sodium restriction, medication taking, regular exercise and contacting healthcare providers in case of worsening symptoms were found to be influenced by both facilitators and barriers (Sedlar et al., 2021).

Effective self-care in HF is a multifaceted approach that hinges on several key facilitators. Facilitators often stemmed from personal, behavioural, and social enablers that collectively enhanced patients' ability to manage their condition. For instance, increased knowledge about HF emerged as a foundational element, empowering individuals to make informed decisions and

adhere to complex care routines. Pre-existing health-promoting habits and strong intrinsic motivation further enabled patients to integrate new self-care behaviours with greater ease (Sedlar et al., 2021). The use of self-monitoring tools, such as diaries, not only provided practical support but also fostered a sense of control and accountability (Sedlar et al., 2021). Additionally, the presence of informal caregivers and the perception of healthcare professionals as trustworthy and competent contributed significantly to building a reliable support system (Sedlar et al., 2021). In some cases, patients reported modifying their social engagements—such as avoiding gatherings that might involve dietary temptations—as a proactive strategy to prevent symptom exacerbation (Sedlar et al., 2021). Together, these facilitators formed a robust framework that supported patients in navigating the complexities of HF self-care.

Navigating the self-care journey for HF can be hindered by numerous barriers. A lack of sufficient knowledge and difficulty in developing new routines often left patients uncertain and unprepared for effective symptom management. Physical and logistical limitations—such as the unavailability of monitoring equipment or the inability to afford care-related resources—further undermined adherence (Sedlar et al., 2021). Trust deficits in healthcare providers and systemic constraints, including financial strain and competing life priorities, added layers of complexity to patients' decision-making processes (Sedlar et al., 2021). Moreover, comorbidities and environmental factors, such as seasonal weather changes, exacerbated the burden of self-care, with specific challenges like increased thirst or fear of falls in winter interfering with routine activities (Sedlar et al., 2021).

Overall, the study underscores that effective self-care in HF is not merely the result of individual effort but is deeply embedded in a broader context of personal beliefs, social support, and structural conditions. Facilitators and barriers do not operate in isolation; rather, they interact to either support or obstruct a patient's capacity for self-management, highlighting the importance of personalised, context-sensitive interventions in HF care.

2.11 Discussion

Self-care has been shown to entail a complex interplay of self-care maintenance, self-care management, self-care confidence and effective delivery of self-care behaviours (Riegel & Dickson, 2008). An extensive network of characteristics has been examined to demonstrate those factors shown to predict or determine either more or less effective expression of self-care.

This analysis was based on the framework of the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2016; Riegel et al., 2022) but also sought additional influences, and identified that personal, disease, problem and environmental factors all affected the self-care of patients with HF.

2.11.1 Personal Factors

In most of the studies reviewed, personal factors such as age, gender, marital status, education, employment, family income, HF knowledge, and self-care confidence were examined as predictors of self-care performance in patients with HF. Age was significantly associated with self-care adherence in the majority of studies which examined this factor. Specifically, older age—typically individuals in their 60s or 70s, rather than in their 50s—was identified as a determinant of inadequate self-care maintenance in two studies (Cocchieri et al., 2015; Siabani et al., 2016); was linked to worse self-care management in two of three studies (Davis et al. 2015; Tawalbeh et al. 2017); and to worse self-care confidence in all three studies (Cocchieri et al. 2015; Davis et al. 2015; Tawalbeh et al. 2017). However, older age was also significantly associated with greater self-care maintenance in one study (Cameron et al., 2009) and greater self-care behaviours in four of seven studies (Liu et al. 2014; Muller-Tasch et al. 2018; Ok & Choi 2015; Peters-Klimm et al. 2013). One study examined the association between age and self-care among patients with HF in Saudi Arabia, which showed no significant associations. However, consistent with most of the studies above, research conducted with hypertensive patients showed older patients (over 50 years) had significantly lower self-care (Bakhsh et al. 2017; Neminqani, El-Shereef & Thubiany 2013). As in this review, a systematic review of factors affecting self-care in patients with HF in studies using the EHfScBS showed inconsistent evidence for associations between age and self-care behaviour (Sedlar et al., 2017).

The associations of gender with self-care adherence were inconsistent across the reviewed studies. In some studies, male gender was significantly predictive of inadequate self-care performance; specifically, lower self-care maintenance in one of six studies (Cocchieri et al. 2015); lower self-care behaviour in one of five studies (Uchmanowicz et al. 2017); lower self-care management in one of seven studies in Italy (Cocchieri et al, 2015); and lower self-care confidence in one of four studies (Cocchieri et al. 2015). However, male gender was associated with greater self-care management in a study conducted in Australia (Cameron et al. 2009), and with greater self-care confidence in one of four studies (Graven et al. 2019). Other studies

showed no significant associations. Similarly, the systematic review by Sedlar et al. (2017) found inconsistent associations between gender and HF self-care behaviours. Although Aljohani (2023) found no significant association between gender and all SCHFI subscales among Saudi participants with HF, other studies that have examined associations between gender and self-care in hypertensive patients in Saudi Arabia have consistently reported significantly inadequate self-care performance in men (AlHadlaq et al. 2019; Bakhsh et al. 2017; Neminqani, El-Shereef & Thubiany 2013).

Single patients were reported with: significantly inadequate self-care maintenance and self-care confidence (Tung et al., 2012); highly significantly inadequate self-care behaviours (Alkouri et al., 2022; Muller-Tasch et al., 2018; Ok & Choi, 2015; Uchmanowicz et al., 2017) in Lebanon, Germany and Poland; whereas in Korea, married patients demonstrated significantly inadequate self-care behaviours (Ok & Choi, 2015) and in Jordan, no significant association was found between marital status and self-care adherence (Tawalbeh et al., 2017) and self-care behaviours (Getachew et al., 2022; Sedlar et al., 2021).

The relationship of education with self-care was mostly consistent across the studies, showing that those with lower educational levels were more likely to have significantly inadequate self-care performance, including: self-care maintenance in two of five studies (Siabani et al. 2016; Tawalbeh et al. 2017); self-care management in two of five studies (Davis et al. 2015; Siabani et al. 2016); and self-care behaviours in three of five studies (Sedlar et al., 2021; Son et al., 2018; Uchmanowicz et al., 2017). Whilst this was consistent with a study of patients with hypertension in Saudi Arabia (Neminqani et al., 2013) that linked lower educational levels with inadequate self-care adherence, the systematic review by Sedlar et al. (2017) showed inconsistent associations between education and HF self-care behaviours and no significant associations were found by Aljohani (2023).

Unemployment was significantly linked with self-care performance in all studies that examined it, with conflicting findings; however, no significant associations were found in one study from Korea (Ok & Choi, 2015). Specifically, unemployment was associated with inadequate self-care maintenance in one of three studies (Tawalbeh et al., 2017); and with inadequate self-care management in two of two studies (Cocchieri et al., 2015; Tawalbeh et al., 2017). However, being unemployed was associated with better self-care behaviours in one of two studies (Kato et al., 2009) and with better self-care confidence (Massouh et al., 2020) but not associated with

self-care confidence in the third study (Cocchieri et al., 2015). One study showed low income as a strong predictor of inadequate self-care maintenance and management but not self-care confidence (Tawalbeh et al., 2017). However these results were not consistent with Aljohani (2023), which showed no association between employment and self-care adherence.

Findings of this integrative review showed that, in all but one study from Japan (Kato et al., 2009), inadequate HF knowledge was consistently linked to inadequate self-care adherence. Lower HF knowledge was a determinant of inadequate self-care maintenance in all four studies that examined it (Al-Hammouri et al., 2020; Davis et al., 2015; Massouh et al., 2020; Tawalbeh et al., 2017); of inadequate self-care management (Tawalbeh et al., 2017) and self-care confidence (Massouh et al., 2020; Tawalbeh et al., 2017); and of inadequate self-care behaviours in Taiwan and Korea (Liu et al., 2014; Ok & Choi, 2015). Moreover, inadequate health literacy predisposed patients to inadequate self-care behaviours (Son et al., 2018).

Six studies examined the association of self-care confidence and self-care performance, with lower self-care confidence significantly predictive of worse self-care maintenance in five studies (Al-Hammouri et al., 2020; Aljohani, 2023; Massouh et al., 2020; Tung et al., 2012; Zhang et al., 2023), and worse self-care management in all four studies that examined it (Aljohani, 2023; Cameron et al., 2009; Massouh et al., 2020; Zhang et al., 2023)

Race, ethnicity, cultural norms, self-efficacy, health locus of control and perceived control, spirituality and religious beliefs, health-related quality of life, feelings about disease, impulsivity, perceived stress and smoking in relation to self-care were discussed less frequently in the reviewed papers. Two studies from the US and one from Brazil reported contradictory findings in relation to patients' ethnicity: Graven et al. (2019) reported people of Caucasian race with HF to be significantly associated with lower self-care management but not self-care confidence or self-care maintenance, whilst Davis et al. (2015) reported black non-Hispanic patients with significantly lower self-care maintenance scores. Gomes da Silva et al. (2023) found no association between self-care confidence and race. Two studies looked at the impact of culture, reporting that self-care adherence was influenced by values and beliefs linked to culture, history, and place, including attitudes about health professionals and services (Clark et al., 2009; Vaughan et al., 2013).

Lower levels of self-efficacy were associated with inadequate self-care adherence (Peters-Klimm et al., 2013), similar to findings of a systematic review of the psychological determinants of self-care in HF (Kessing et al., 2016). Perceived control significantly predicted both self-care maintenance and management in HF patients without mild cognitive impairment. Low perceived control over their heart condition predicted lower participation in self-care in patients with HF (Lee et al., 2019) and significantly influenced perceived control using the EHFSBS-9 (Sedlar et al., 2021), although health locus of control was not linked with adherence to self-care behaviours (Kato et al., 2009).

In the qualitative component of one mixed-methods study, self-care practices were revealed as shaped by spiritual beliefs. Most HF patients used prayers to direct actions, believing that God's will provided all that was needed; others, described as equally religious, saw self-care as listening to and following the advice of healthcare professionals (Vaughan et al., 2013).

The relationship between perceived health-related quality of life and self-care behaviours (assessed with the EHFSBS-12) was examined in one study, which found a higher perceived health-related quality of life independently associated with inadequate self-care adherence (Peters-Klimm et al., 2013). These findings were not in line with those of the systematic review conducted with studies identifying factors influencing self-care in HF, which found consistent non-significant association between health-related quality of life and HF self-care behaviour (using the EHFSBS scores) (Sedlar et al., 2017).

Al-Hammouri et al. (2020) examined the association of perceived stress and impulsivity with self-care maintenance and confidence and found that impulsivity and perceived stress were associated with inadequate self-care maintenance. Smoking was examined in relation to self-care maintenance and confidence and not found significant (Gomes da Silva et al., 2023).

2.11.2 Problem or Disease Related Factors

Disease related factors such as cognitive function, HF duration, acute healthcare services, HF symptom severity, co-morbidities and treatment, and number of medications were discussed in most studies. Lower cognitive function was a determinant of inadequate self-care practices (self-care maintenance, management and confidence) in Italy (Cocchieri et al., 2015) and of inadequate self-care behaviours in Poland (Uchmanowicz et al., 2017). In addition, lower levels

of the composite scores of executive functions predicted worse self-care management in HF patients with mild cognitive impairment (Lee et al., 2019).

There were conflicting results for HF duration, with shorter time since diagnosis significantly associated with inadequate self-care maintenance in two studies (Cocchieri et al., 2015; Siabani et al., 2016), highly significantly predictive of lower self-care management scores in one study (Tawalbeh et al., 2017) but not predictive of self-care confidence (Tawalbeh et al., 2017) or self-care behaviours (Uchmanowicz et al., 2017). This pattern may be explained by the greater experience and skills accruing with longer duration of living with the disease not necessarily being reflected in confidence or motivation to change behaviour. Although greater numbers of hospital admissions in the preceding year were statistically significantly associated with better self-care management in Iran (Siabani et al., 2016), each successive hospitalisation was association with inadequate self-care confidence (Gomes da Silva et al., 2023) and with inadequate self-care behaviours in Poland (Uchmanowicz et al., 2017), and was not associated with self-care maintenance, management or confidence in Jordan and Saudi Arabia (Aljohani, 2023; Massouh et al., 2020; Tawalbeh et al., 2017), or with self-care behaviour in the Netherlands (Gallagher et al., 2011) or Japan (Kato et al., 2009) or Ethiopia (Getachew et al., 2022). These inconsistent findings may reflect differences in management practices and hospital admission criteria as much as individuals' self-management expertise.

There were contradictory findings for the effects of HF severity or functional limitation. More severe HF symptom severity and severe NYHA classification were significant predictors of better self-care maintenance in the US and China (Davis et al., 2015; Zhang et al., 2023), while one study conducted in Lebanon found HF patients with lower NYHA class (I or II) had significantly better self-care maintenance (Massouh et al., 2020). Although severe NYHA class was associated with better self-care management (Davis et al., 2015), it predicted inadequate self-care management (Cocchieri et al., 2015) and significantly lower self-care behaviours in Poland (Uchmanowicz et al., 2017). However, consistent with the systematic review by Sedlar et al. (2017), NYHA class was not associated with self-care behaviours in six other studies from the Netherlands, Ethiopia, Japan, Germany and Korea. Also, an increased LVEF score was associated with better self-care maintenance and confidence, and higher functional status predicted inadequate self-care behaviours, but no association was seen with any SCHFI subscale.

The influence of numbers and severity of comorbid conditions and depressive symptoms was found to be contradictory. Cameron et al. (2009) found moderate to severe levels of comorbidity were strongly predictive of greater self-care maintenance and management in HF patients. Obesity was associated with inadequate self-care maintenance, whereas having dialytic renal failure was associated with better self-care maintenance (Gomes da Silva et al., 2023). Sleep apnoea was associated with better self-care management, but no association was found with COPD in Brazil (Gomes da Silva et al., 2023). Determinants of inadequate adherence to self-care behaviours were identified as diabetes mellitus (DM) (Kato et al., 2009) and peripheral arterial disease (PAD) (Peters-Klimm et al., 2013), whereas insomnia was a determinant of better adherence to self-care behaviours (Alkouri et al., 2022); however, two other studies found no significant associations between self-care behaviours and any comorbidities, DM (Gallagher et al., 2011) (Alkouri et al., 2022) or COPD (Gallagher et al., 2011) or anxiety (Muller-Tasch et al., 2018). A systematic review of studies using the EHfScBS found depression linked to self-care behaviours (Sedlar et al., 2017), whilst another systematic review showed that depression, but not anxiety, was significantly associated with inadequate self-care. Frailty, examined in one study, was not linked to self-care behaviours (Son et al., 2018). Depressive symptoms were linked with inadequate self-care management but not self-care maintenance (Cameron et al., 2009) and not with self-care maintenance and confidence (Al-Hammouri et al., 2020). The depression severity score significantly independently predicted inadequate self-care behaviours by Getachew et al. (2022) in Ethiopia.

Fewer medications taken per day (possibly a proxy for lesser symptom severity) were significantly associated with inadequate self-care maintenance and confidence (Cocchieri et al., 2015). Another study (Gomes da Silva et al., 2023) found each additional medication was significantly associated with increasingly inadequate self-care confidence but no association with maintenance. Presence of a prosthetic heart valve was associated with better overall self-care behaviours, but taking a beta blocker and/ or digitalis was linked to inadequate self-care behaviours (Getachew et al., 2022), while treatment with diuretics was not associated with self-care behaviours (Son et al., 2018).

These inconsistent impacts of disease and problem-related factors can probably be attributed to the divergent structures and resources within health systems, as well as the varying levels of healthcare support available across different countries. Factors such as access to

medical services, availability of specialized treatments, quality of healthcare facilities, and cultural attitudes towards healthcare can all contribute to the disparities observed in the effects of diseases and treatments among populations worldwide.

2.11.3 Environmental Factors

Social support and patients' social situations were examined in most of the reviewed studies, while living area was examined in two studies in this integrative review. Findings consistently showed that patients with HF who had low levels of social support reported significantly inadequate self-care behaviours (Gallagher et al., 2011; Getachew et al., 2022; Ok & Choi, 2015), inadequate self-care maintenance (Davis et al., 2015; Lee et al., 2019; Massouh et al., 2020) and inadequate self-care confidence (Davis et al., 2015; Zhang et al., 2023). Both the quantitative and qualitative components of a mixed-method study found significant bivariate correlations between lower social support and worse self-care maintenance and self-care confidence (Vaughan et al., 2013). Most patients expressed that social support and social norms played a critical role in their daily self-care practices; tangible support through family with self-care maintenance behaviours (e.g., preparing low-salt meals) as well as other daily living activities behaviours was influenced by social norms (Vaughan et al., 2013).

However, differing cultural patterns and social norms were reflected in inconsistent results regarding domestic social situations, examined in eleven studies. Fewer people living with these participants was highly significantly predictive of inadequate self-care maintenance, self-care management, and self-care confidence in one study conducted in Jordan (Tawalbeh et al., 2017), although having a caregiver was a determinant of inadequate self-care maintenance in study conducted in Italy (Cocchieri et al., 2015). Numbers of children and their child relationship status were examined and found to indicate that each extra child was associated with less adequate self-care maintenance, while having a married child was associated with inadequate self-care management in a Brazilian study (Gomes da Silva et al., 2023). In Iran, patients living with children and others (compared to those living alone or with a spouse only) had significantly lower levels of self-care management (Siabani et al., 2016) which was inconsistent with two other studies that showed no associations between self-care maintenance and management and living with support in Australia (Cameron et al., 2009) or number of family members in Saudi Arabia (Aljohani, 2023). Finally, living in more developed areas was significantly predictive of better self-care

behaviours in a study conducted in China (Zhang et al., 2023), whereas no association was shown by Tawalbeh et al. (2017).

The differing patterns of association observed across these countries likely stem from tangible variations in the functioning and dynamics of family relationships and support structures in relation to self-care. These differences can manifest in various ways, including the extent of intergenerational support, the prevalence of extended family networks, and the cultural norms surrounding caregiving responsibilities. In some countries, strong familial bonds may result in robust support systems, where family members actively participate in caregiving duties and provide emotional, practical, and financial assistance to individuals with their health needs. Conversely, in other contexts, societal changes such as urbanisation, migration, and shifting family dynamics may lead to fragmented support networks and increased reliance on formal healthcare services. Understanding these nuances in family relationships and support structures is crucial for developing tailored interventions and policies aimed to improving healthcare outcomes, promoting well-being and improving self-care adherence across patients with HF in diverse cultural and social contexts.

2.11.4 Strengths and Limitations of the Review

This integrative review has several strengths. These include the use of a systematic approach; with assistance from a librarian, literature searching in five databases was comprehensive and revealed 26 papers published in the period between 2009-2024. The systematic approach employed the well-recognised methodology popularised by Whittemore and Knafl (2005). The Situation-Specific Theory of Heart Failure Self-Care, globally recognised and widely used, was applied as the theoretical framework and was found to be useful to enhance the conceptual understanding.

The limitations of this review include, first, that many of the studies included in this review used a cross-sectional observational design (23 studies), and hence, the potential factors influencing self-care in patients with heart failure could not be fully understood. While an observational research design has the potential to offer insights into patients' situation and experiences, it cannot establish causation. Second, it is important that there is validation work undertaken before using a tool in a different country, culture or population, to establish that it has been appropriately translated using the correct wording. Additionally, it is important that

the tool is culturally congruent for use in that different population, especially where the tool was developed in a different culture and population. It was not always clear whether the tools used in the reviewed studies had been shown to be valid for use in the studies' host countries. Third, the review was necessarily limited to a selection of specific research terms, and relevant articles could have been missed. Fourth, included studies were limited to English language articles, which could have missed relevant studies published in other languages.

2.11.5 Conclusion

In conclusion, this literature review examined associations between self-care and personal, disease-related and environmental factors in patients with HF. While it identified some consistent patterns of association, significant discrepancies in results were also observed. The findings highlighted considerable variations across countries and cultures, and even within different sample groups within a single country, regarding the influential factors affecting HF patients. Self-care maintenance, self-care management, self-care confidence, and self-care behaviours appeared to be influenced by a diverse array of factors. This suggests that the demographic differences observed in study samples may reflect broader cultural and environmental contexts, including the availability and accessibility of healthcare services for patients. However, some factors were addressed only in single studies, highlighting the need for more research. Notably, among of the 26 studies reviewed, only two examined the impact of culture. One of these studies focused on participants from three rural sites in Canada, while the other examined an ethnic minority black population in the US. This indicates a clear necessity for additional research to explore the roles of culture, religion, and social environments on the self-care practices of patients with HF, particularly in the context of Saudi Arabia.

Currently, there is limited evidence supporting the promotion of self-care adherence among patients with HF in Saudi Arabia (Aljohani, 2023). Healthcare providers primarily rely on evidence derived from studies conducted in other countries, which may not be directly applicable to the HF patient population or the resources available in Saudi Arabia (AlHabeeb et al., 2019). To effectively develop interventions that improve services and care for patients with HF in Saudi Arabia, it is essential to examine the factors affecting self-care outlined in this review. Further work is necessary to ensure that current, locally relevant information is accessible for policy formulation, practice, and service development in Saudi Arabia.

Chapter Three: The Methodology and Methods of the Thesis

3.1 Introduction

This chapter presents a comprehensive explanation of the chosen research methodology and methods accompanied by the theoretical framework that forms the foundation of the study. The rationale behind these selections is explained, emphasising their alignment with the research objectives to maintain transparency and clarity throughout the research process.

The chapter encompasses the articulation of the research aims and questions and proceeds to provide a detailed account of the research design and methods. This includes the study setting, population and samples of the study, specifying the sample size and sampling approach and outlining the criteria for inclusion and exclusion. The chapter addresses participant recruitment strategies, the processes of data collection, the instruments employed in the study, the methods used for data analysis, ethical considerations and project management aspects.

3.2 Research Design

A mixed-methods design was chosen for this study, as it enables the integration of qualitative and quantitative data to produce a rich and robust interpretation of the topic under investigation. The rationale for using mixed methods in this study is rooted in the lack of data and research related specifically to Saudi patients, as well as the minimal literature available from the Middle East in general. The chosen theory was selected because of its broad relevance and demonstrated applicability across various cultural contexts, which supports its use in this new setting where it had not previously been tested. Therefore, while this study employed a guiding theory and used the qualitative phase of the study to examine its relevance with this population, the mixed-methods approach remains essential to address the significant data gap in this cultural context and to generate more comprehensive and nuanced insights.

An exploratory sequential mixed-methods study design was used in this study (Creswell & Plano Clark, 2018). This design is suitable for exploring a phenomenon, especially when variables are unknown or there has been no guiding theory or framework previously applied. Application of this design began qualitatively so that the results of the first (qualitative) phase could help develop and inform the second (quantitative) phase.

Using an exploratory design in this research, particularly in the context described, offered several benefits. Firstly, it facilitated an exploration of participants' thoughts, opinions, and self-care practices related to HF through the qualitative phase. This qualitative exploration yielded rich data, capturing nuances and complexities not easily attained through quantitative measures alone. Secondly, qualitative methods excelled in identifying emerging patterns, themes and issues within the data, contributing to a more comprehensive understanding of the research problem. Thirdly, the subsequent quantitative study allowed the researcher to test and confirm findings from the qualitative analysis, validating initial insights and providing a broader perspective with a larger, more representative sample. Integrating both qualitative and quantitative methods enabled the researcher to achieve a holistic understanding, as qualitative data provided depth and richness while quantitative data offered breadth and generalisability. Finally, this combination empowered the researcher to generate nuanced and evidence-based recommendations for improving self-care practices in HF patients, grounded in both qualitative insights and quantitative validation, thus effectively identifying the needs of the target population (Jafer et al., 2021). This design was particularly useful in the situation of this study, where the researcher needed to identify important variables to study quantitatively, where the variables were unknown and it was important to test aspects of theory or classification (Creswell & Plano Clark, 2018).

At study onset, there was limited information about factors affecting the self-care performance of patients with HF in Saudi Arabia. At this time, the evidence applied for the development of self-care programs came from other cultures, which could differ significantly to that of Saudi Arabia. Therefore, the first component of the current study (Phase One) was qualitative, to obtain detailed narrative accounts by interviewing the patients about their experiences of HF self-care adherence: how they perceived and practised self-care in relation to their disease and what that meant to them; what cultural beliefs and values shaped the self-care practices of these patients; and what other factors facilitated or presented barriers to their self-care adherence. Previous studies had overlooked the potential influence of cultural factors on self-care among patients with HF (Vellone et al., 2013) and the self-care of patients with HF had not previously been studied in Saudi Arabia using a theoretical framework. It was unknown if existing self-care tools would be applicable and provide a comprehensive reflection of the unique experiences of Saudi Arabian HF patients. The knowledge gained from the qualitative component

was used to guide the examination of existing validated survey instruments for their comprehensiveness and applicability to HF patients in Saudi Arabia.

The first component (Phase One) employed an exploratory-descriptive qualitative approach (Creswell & Plano Clark, 2018). This design offered the opportunity to investigate a phenomenon that has received limited attention in existing literature, providing an avenue for participants to actively contribute to the generation of new knowledge within the particular topic (Polit & Beck, 2021). This approach has proved invaluable for exploring previously unexplored or minimally studied phenomena, facilitating the development of conceptual and theoretical frameworks through the generation of detailed textual descriptions of experiences. Thus, besides revealing the perspectives of this particular population subset, the interview data were used to inform and confirm the survey content.

The second component (Phase Two) involved collecting quantitative data using one-point-in-time cross-sectional survey methods. One point in time means that data were gathered from participants at a single instance, rather than over a period of time. Participants in this cross-sectional study were selected based on the inclusion and exclusion criteria set for the study. This allowed the investigator to quickly examine the association between study variables (Setia, 2016). Established tools were chosen for use, where appropriate translated and validated versions were already available. The content of the tools was compared to Phase One findings to ensure that the tools allowed for comprehensive collection of data on variables of significance for this population.

Interview and survey data were then triangulated (Klassen et al., 2012; O’Cathain et al., 2010) to address study research questions as to the nature and extent of the self-care practices of patients living with heart failure in Saudi Arabia, and those factors that affected these patients’ self-care practices.

For theoretical development, it is crucial to build upon a self-care conceptual framework. This foundation is essential for gaining a deeper understanding of the impact of culture and other influential factors on self-care behaviours, and subsequently, for comprehending the profound influence of these behaviours on overall health. To identify self-care among patients with HF and the factors affecting adherence to self-care in Saudi Arabia within a theoretical framework, this study used the Situation-Specific Theory of Heart Failure Self-Care to examine self-care in Saudi

patients with HF. It sought to determine the extent to which personal, problem, environmental and any other factors influence self-care maintenance, management, and confidence. Given the absence of prior research, no alternative theories or frameworks have been tested or proven suitable for application in the context of Saudi Arabian patients with HF.

3.3 Theoretical Framework

The Situation-Specific Theory of Heart Failure Self-Care was deemed the most appropriate theoretical framework for the current study due to its tailored focus on HF patients (see Section 1.3.1 for other possibly relevant theories). This theory emphasises the reflective and interactive components of situational factors, the interpretation process, and actions taken. The Situation-Specific Theory of Heart Failure Self-Care has been widely used and has proven valuable in understanding the decision-making processes of patients living with HF, owing to its specific focus on HF and the key elements of self-care (maintenance, management and confidence). It has served as a guiding framework for interpretation and synthesis in a review of factors influencing self-care in these patients (Riegel et al., 2016). Therefore, the Situation-Specific of Heart Failure Self-Care Theory was used as a framework to facilitate the identification of key variables during the literature review, to enhance the interpretation and understanding of patients' experiences during interviews and provide a guiding framework for the qualitative phase of the study. Additionally, it informed the selection of variables for the regression analysis and offered a comprehensive perspective on the concept of self-care for the quantitative phase of the study.

Whilst the Situation-Specific Theory of Heart Failure Self-Care appears an appropriate theory to apply for this study, it is essential to recognise that theories are generated through research and may not always be generalisable. Therefore, they need validation in different settings and populations before they can be applied to unique populations (Mermelstein & Revenson, 2013). Hence, the Situation-Specific Theory of Heart Failure Self-Care needs to be interrogated and constructively tested in the Saudi context. A key contribution of this thesis is the use of the Situation-Specific Theory of Heart Failure Self-Care as a theoretical framework to understand patients' experiences and classify potential predictors within an Arabic population.

3.4 Research Aims, Questions and Objectives

The aims of this research were to explore the self-care practices of patients living with heart failure in Saudi Arabia, and to identify the factors that affect these patients' self-care practices within the Middle Eastern context of Saudi Arabia.

This study addressed the following research questions:

1. How do patients living with heart failure in Saudi Arabia perceive and practice self-care in relation to their disease?
2. What is the level of self-care adherence in patients living with heart failure in Saudi Arabia?
3. What factors are associated with, facilitate or present barriers to self-care adherence in patients living with heart failure in Saudi Arabia?

3.6.1. What personal factors are associated with, facilitate or present barriers to self-care adherence in heart failure patients?

3.6.2. What problem or disease-related factors are associated with, facilitate or present barriers to self-care adherence in heart failure patients?

3.6.3. What environmental factors are associated with, facilitate or present barriers to self-care adherence in heart failure patients?

3.6.4. What, if any, other factors are associated with, facilitate or present barriers to self-care adherence in heart failure patients?

This study was conducted in two phases.

Phase One objectives were:

- To conduct semi-structured interviews to explore the self-care experiences of patients living with heart failure in Saudi Arabia in relation to their disease.
- To determine those factors which affect the self-care practices of patients with HF in Saudi Arabia.
- To identify the main barriers and facilitators of self-care practices of patients with HF in Saudi Arabia.
- To gather insights to inform the choice of a survey, to be conducted in the next phase.

Phase Two objectives were:

- To assess the overall level of self-care among patients with HF living in Saudi Arabia using the Self-Care of Heart Failure Index (SCHFI), and to compare SCHFI component variables with those identified in Phase One as locally relevant determinants of self-care.
- To survey patients living with heart failure in Saudi Arabia to assess their level of adherence to best-practice self-care, and to identify those personal, disease-related, environmental and other factors that significantly influence self-care for these patients.

3.5 Setting

This study was conducted in Saudi Arabia at the King Abdulaziz Specialist Hospital (KASH), a tertiary referral hospital in Aljouf City. Aljouf City is located in the northwest of Saudi Arabia with a population of 531,952 people from Saudi Arabia, where the total population was around 31 million in 2019 (GASTAT & Arabia, 2021). The KASH has a clinical capacity of 300 beds including 35 beds in the Cardiac Centre. Recruitment and data collection took place in the outpatient clinics affiliated to the Cardiac Centre, which receives around 20-30 patients with cardiac problems per day.

3.6 Participants and Recruitment

The target population for the study was patients with HF who visited outpatient clinics of the Cardiac Centre at the KASH. A sample was obtained from this population during the period from April 2022 to July 2023. Patients meeting inclusion and not meeting exclusion criteria were consecutively sampled.

Inclusion criteria for the study sample were:

- Patients with a medically confirmed diagnosis of heart failure.
- Patients aged 18 years and older.
- Patients fluent in the Arabic language.

Exclusion criteria for the study sample were:

- Patients with any currently uncontrolled severe mental disease or cognitive impairment that could hinder their ability to provide informed consent, such as schizophrenia, schizoaffective disorder, manic depressive

disorder, severe major depression, autism or dementia, as recorded in their medical file or evidenced through cognitive screening.

Patients with HF who visited the outpatient clinics were identified through the hospital admission record system and a member of the research team contacted them to invite them to participate in the study. Patients were approached in the waiting room while awaiting their cardiologist consultation or after the consultation ended.

3.6.1 Sampling Strategy

Convenience sampling was applied to recruit consecutive patients with HF who presented for routine care at the Cardiac Centre at the KASH. In both phases of the study, the sampling procedure proceeded similarly.

3.6.2 Sample Size

3.6.2.1 Phase One Sample Size

For the semi-structured interviews, it was anticipated that a target sample size of approximately 10 to 20 participants (Creswell & Creswell, 2018) would be sufficient to achieve rich data about HF patients' perceptions of self-care and their practices, but the actual number was determined by achievement of theoretical saturation (Hennink et al., 2017; Marshall et al., 2013). Thus, data collection ceased when the researcher reached a point where it was no longer producing new information and further sampling was not anticipated to lead to new information related to the topic (Hennink et al., 2017; Marshall et al., 2013). A general statement about use of theoretical saturation to determine sample size for qualitative research is that the process of data collection and analysis should proceed until the point at which no new codes or themes emerge and the collected data ensures that the study's findings are rich, comprehensive, and reflective of the complexity of the researched phenomenon (Hammersley, 2015). Francis et al. (2010) suggested two principles by which to determine that saturation had been reached. This entails (1) defining an initial analysis sample size (e.g., 10 interviews) to be used and (2) a stopping criterion, that is, a number of interviews (e.g., 4) that need to be conducted until no new data are produced, in order to determine that saturation has been achieved.

After conducting 10 interviews and completing the initial data analysis, an additional 4 interviews were carried out. However, these subsequent interviews yielded no new data, indicating that data saturation had been achieved.

3.6.2.2 Phase Two Sample Size

The dependent variables of this study were the measures of self-care maintenance, self-care management and self-care confidence in patients with HF. The independent variables were factors shown to be significantly linked with self-care in the existing literature. The literature review reported in Chapter Two identified twenty-two variables as significantly linked to self-care in HF patients. These included: age, gender, marital status, living circumstances, educational level, perceived adequacy of income, employment status, religion, current smoking, HF knowledge, NYHA class, comorbidity, cognitive function, HF duration, number of hospital admissions in the last year, numbers of current medications, medication adherence, depression, anxiety, social support, and having a family or paid caregiver. Additionally, seven other variables, reported as important by participants during the interviews and identified in Phase One analysis, were incorporated into the questionnaire. These included: other health issues preventing cardiac self-care activities, the availability of time for self-care, clarity of instructions regarding self-care, comfort in seeking advice from healthcare professionals, types of physical activities commonly engaged in, primary motivations for self-care, and perspectives on the usefulness of the internet and social media in cardiac self-care. Together, 29 potential independent variables were identified through these processes.

Green (1991) recommends a rule of thumb equation for sample size ($N \geq 50 + 8(k)$, where k is the number of predictor variables). Accordingly, the required sample size would be $50 + 8(29) = 282$. To ensure feasibility within the timeframe of the PhD, the common practice was adopted of only entering variables for regression analysis that showed a significance level of $p < 0.25$ in bivariate analysis (Cohen et al., 2013; Tabachnick et al., 2019). Preliminary bivariate analyses found that, for the three proposed regression models (measurement of self-care maintenance, self-care management and self-care confidence), a maximum of 19 variables achieved this level of significance. Nineteen, eleven, and fifteen potential independent variables were deemed eligible for inclusion into the self-care maintenance, management, and confidence regression models, respectively. Therefore, $50 + 8(19) = 202$ participants were needed to include 19 variables, and 205 participants were recruited for Phase Two of the study.

3.6.3 Participant Recruitment

Between April 2022 to September 2022 for Phase One, and December 2022 and July 2023 for Phase Two, patients with HF referred to outpatient clinics were identified through the

admission record system in the clinic booking list in the Cardiac Centre and their eligibility to participate in the study was determined based on their medical records. Patients who met the study eligibility criteria were approached by the researcher when they attended the Cardiac Centre at the KASH, and the study purpose and objectives were explained. Patients who were interested in the study were provided with further details about the study. The approach to participant recruitment was similar across both phases of the study.

3.7 Data Collection

3.7.1 Phase One Data Collection

Individual face-to-face semi-structured interviews were conducted to explore HF patients' perception of self-care practice and identify factors that facilitated or hindered self-care practice from the patients' perspectives. Individual interviews were chosen rather than group or focus-group sessions to comply with COVID-19 precautions. Saudi Arabia lifted most restrictions on 5 March 2022, when the Ministry of Interior removed social-distancing requirements in all indoor and outdoor venues, including mosques. Mask-wearing remained mandatory only indoors, and arriving travellers no longer needed a negative PCR or rapid antigen test or to quarantine. Phase One interviews therefore began in April 2022, after most restrictions had been relaxed. Nonetheless, the pandemic may still have influenced patients' willingness to leave home, attend clinic appointments, or participate in group-based interviews.

Further, patients were anticipated to feel more comfortable to share their personal beliefs and behaviours in relation to their health and wellbeing and their adherence to medically prescribed practices in a private interview rather than with others present.

Phase One data collection took place before or after patients' routine appointments with their cardiologists, depending on the time available and the patients' preferences. The first phase entailed collecting qualitative data using semi-structured interviews. Patients who were interested in the study were provided with details about the study. Participants were given the choice to be interviewed either face-to-face at the hospital on the day of their out-patient appointment, in a private location such as an empty examination room or office at their convenience. During this study, no participants opted for interview by telephone.

An interview guide was prepared, using the Situation-Specific Theory of Heart Failure Self-Care to guide the questions, and discussed and agreed among the supervision team. A series of

open-ended questions were asked. Open-ended questions allow and encourage participants to talk freely about their self-care practice (Weller et al., 2018). Areas of disease management anticipated to be discussed included common self-care practices such as food choices, fluid and salt restriction, weight management, smoking cessation, regular physical activity, and adherence to medications. Prompts and follow-up questions were asked, and participants were encouraged to seek clarification when needed (see Appendix 3: Interview guide). The interview questions were reviewed and minor revisions to prompts made after the initial three interviews.

3.7.2 Phase Two Data Collection

Participants were given the option to choose their preferred survey data collection method. They were asked whether they would like to complete the survey either through a face-to-face interview on the day of their out-patient appointment or via a paper-based questionnaire which they could take home and return by post.

Participants' understanding of survey questions can influence the validity of data collected, especially for self-reported questionnaires (Althubaiti, 2016). To ensure thorough understanding, the survey was administered exclusively in Arabic, and only participants fluent in Arabic were recruited. Patients were given the option to have the questionnaires read aloud in a private room, which could be particularly beneficial for individuals with low educational attainment, visual impairment or fatigue, to help ensure their understanding of the questions. A reminder/second survey was posted to participants who agreed to take part but did not return the initial paper-based questionnaire within two weeks.

An information pack was provided to all participants containing a letter of introduction, the participant information statement, consent form and, for those who opted for the paper-based survey, the questionnaires in paper form were also provided. Completion of the questionnaire took about 30-45 minutes per participant. Survey data were collected in Arabic and then translated into English and entered into SPSS version 26.

3.7.2.1 The Survey Instruments

A questionnaire was developed for the purpose of addressing the study research questions. In line with the study theoretical framework of the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2022; Riegel et al., 2012), the survey was designed to collect information on

personal, disease and problem-related characteristics and environmental characteristics of the participants.

To select the independent variables, prior studies examining factors predictive of self-care adherence in patients with HF were reviewed. Relevant content from Chapter Two—specifically Sections 2.10.3 and 2.10.4—was used to guide this process. Additionally, factors identified by participants in Phase One as influential in self-care decision-making among individuals with HF in Saudi Arabia were considered. Any factors not already represented in the existing measurement tools were incorporated accordingly.

Wherever possible, valid and reliable instruments in validated and reliable Arabic language versions were chosen to assess independent and dependent variables. The internal consistency of each of these instruments with this sample was tested using the Cronbach alpha.

Cognitive Function

To confirm participants met the required level of cognitive function to meet Phase One and Two inclusion criteria, and to collect data on their cognitive abilities as a potential independent factor influencing self-care, the researcher opted to administer the Mini-Cog assessment (Borson et al., 2000) as the initial assessment.

The Mini-Cog is a screening tool, not a diagnostic tool, which takes no more than three minutes to complete. This scale has minimal language content, which decreases potential cultural and educational bias (Borson et al., 2000). An Arabic version of this scale is available (Albanna et al., 2017) and used throughout the Saudi Ministry of Health, and this version was used in this study.

Reliability and Validity

The Mini-Cog has shown high sensitivity (99%) and specificity (96%) in a community sample of n=249 culturally, linguistically, and educationally diverse older adults (Borson et al., 2000). Albanna et al. (2017) showed that Mini-Cog is a good screening tool for cognitive impairment in Arab populations, with sensitivity and specificity of 71.4% and 61.6%, respectively.

Scoring

Mini-Cog consists of two parts which generate a potential maximum score of five points: a three-word recall (three points) and a clock drawing test (two points). Points scored range from

0-5, with a score 0-2 indicating possible impairment while scores of 3-5 indicate impairment is unlikely (Borson et al., 2000) (see Appendix 5 and Appendix 6 for the English and Arabic versions).

Following the Mini-Cog administration, participants were then offered the choice between completing a paper-based or electronic version of the questionnaire, or completing it verbally face to face or during a phone interview. The survey contained the following components.

Socio-demographic and Clinical Information

Socio-demographic and clinical information included age, gender, marital status, living circumstances, highest educational attainment (whether primary school (grades 1 to 6), secondary school (grades 7 to 9), or high school (grades 10 to 12), religion, perceived income adequacy, and employment status. In addition, information about participants' NYHA class and comorbidities were extracted from their medical records. The NYHA is explained in Chapter One at section 1.1.1.

The Charlson comorbidity index (CCI) was used to assess comorbidities in study participants (Charlson et al., 1994). This tool allows calculation of the degree of comorbidity using administrative data. The Combined age-CCI (CA-CCI) is a version of the score created to address the confounding impact of age on comorbidities by adding one point to the CCI score for each decade of age over 40 years (Roffman et al., 2016).

Reliability and Validity

The CCI's ability to predict mortality, complications, length of hospital stay, use of acute care resources and cost of care provide evidence of validity (Roffman et al., 2016). The CCI has been shown to be reliable and valid in a diverse range of healthcare settings. It has high test re-test reliability with interclass correlation coefficients of 0.92 ($p < 0.0001$) (Roffman et al., 2016). It also has content validity, because the diseases and their severity weights have been derived from relative risks of a comparative regression model to estimate the risk of death (Charlson et al., 1994).

Scoring

The CCI consists of 19 comorbidities; two subcategories are for liver disease and diabetes. Comorbidities are weighted from 1 to 6 for mortality risk and disease severity; the weighted scores are summed and combined with age variations and then summed to form the total CCI

score. The severity of comorbidity was classified into three levels according to the CCI score: mild (CCI scores 1-2), moderate (CCI scores 3-4), and severe (CCI scores ≥ 5) (Charlson et al., 1987) (see Appendix 7).

Additional Variables Derived from Phase One Interview Data

This section also included questions derived from Phase One findings about type of physical activity, motivation, time availability for self-care activities, and the influence of internet and social media on such behaviours. Other health-related questions were also posed, aiming to identify other health issues or concurrent challenges that might impede their engagement in heart health self-care activities, including presence of a caregiver (either family or paid caregiver), the number of current medications and experiences of side effects, and their relationship with health professionals, including the guidance received and their comfort level in asking questions and discussing concerns with them, comprising 25 items (refer to Appendices 8 and 9).

Participants' demographic characteristics and clinical information were obtained from their medical records prior to or after their interview or survey to save time and reduce the burden on participants (see Appendices 8 and 9).

Self-care Adherence

Participants' adherence to heart failure self-care was assessed using the self-care of heart failure index (SCHFI). The SCHFI, developed by Riegel et al. (2009), comprises 22 items distributed across three components to measure self-care adherence in patients with HF. The Arabic version of the self-care of heart failure index (A-SCHFI) was used. This tool has been shown to be valid and reliable to measure self-care in Lebanese participants and can be used with Arabic-speaking patients (Deek et al., 2016).

Reliability and Validity

Riegel et al. (2009) calculated the coefficient alpha to assess the internal consistency of the English version of the SCHFI v-6 in a cohort study with 154 community-dwelling out-patients with HF. For self-care maintenance, self-care management and self-care confidence, Cronbach's coefficient alpha values were 0.553 (95% CI 0.439–0.651; 0.542 standardised), 0.597 (95% CI = 0.434–0.725; 0.590 standardised) and 0.827 (0.781–0.866; 0.836 standardised), respectively. The

variances in mean values of the SCHFI subscales were significant at $F = 122.45$, ($p < .001$), $F = 3.71$ ($p < 0.001$) and $F = 20.58$ ($p < .001$) for self-care maintenance, management and confidence respectively, indicating significant response variation within individuals. The intercorrelation between the three subscales was not significant (>0.43) (Riegel et al., 2009). The validity of the English version of the SCHFI v-6 was supported in a mixed-method study triangulating quantitative and qualitative data (Riegel et al., 2009) and the confirmatory factor analysis indicated the SCHFI model fit was adequate ($\chi^2 = 329.9$, SCHFI v.6: $\chi^2 = 356.92$). Deek et al. (2016) assessed the psychometric properties of the Arabic version (A-SCHFI) with 223 Lebanese patients with HF. Ten experts approved the validity of the A-SCHFI, which was also supported based on the comparative fit index and the composite reliability coefficients of 0.87, 0.97 and 0.97 for the maintenance, management and confidence subscales, respectively.

Scoring

The first component, the self-care maintenance subscale, comprises ten items assessing patients' behaviours in maintaining self-care. Patients' responses range from 1 (never or rarely) to 4 (always or daily). The second component, the self-care management subscale, consists of 6 items which assess patients' response to abnormal symptoms and self-care management when they occur. The third component, the self-care confidence subscale, has six items that measure patients' confidence in performing specific self-care tasks. All items of the SCHFI use a four-point Likert scale, except for item 16 of the self-care management scale, which uses a five-point Likert scale. The standardised total score ranges from 0 to 100 (Riegel et al., 2009) with higher scores reflecting higher self-care maintenance, management or confidence. Scores of ≥ 70 are considered to reflect adequate self-care (see Appendix 10 and Appendix 11 for the English and Arabic versions).

HF Knowledge

The Dutch HF knowledge scale (DHFKS) was used to assess participants' knowledge about HF disease, comprising 15 items (van der Wal et al., 2005). An Arabic version of this scale is available and was used in this study (Tawalbeh et al., 2017).

Reliability and Validity

The internal consistency of the DHFKS was assessed in 902 patients with HF and Cronbach's alpha in this population was 0.62 (van der Wal et al., 2005). The DHFKS demonstrated face,

content and construct validity when examined in patients with HF in the Netherlands. The scale was able to distinguish between HF patients with a high and low level of knowledge and the difference was statistically significant ($t = -7.14$; $p = 0.0001$) (van der Wal et al., 2005). Although there are no psychometric tests of the DHFKS Arabic version, many patients have reported understanding the terms used because they are used in patient health education and in clinical practice (Tawalbeh et al., 2017).

Scoring

The DHFKS consists of 15 multiple choice questions measuring knowledge of the disease process (four questions), symptom recognition (five questions) and HF treatment (six questions) (van der Wal et al., 2005). Responders choose one correct answer from three options. The total score ranges from a minimum score of 0 points (no knowledge about HF) to a maximum score of 15 points (a high knowledge about HF) (van der Wal et al., 2005) (see Appendix 12 and Appendix 13 for the English and Arabic versions).

Social Support

The multidimensional scale of perceived social support (MSPSS) was used to assess the perceived adequacy of support from family, friends and significant others as these are the major social support sources (Zimet et al., 1988). The scale incorporates three sub-scales that separately score support available from a significant other, family and friends. An Arabic version of this scale is available and was used in this study (Merhi & Kazarian, 2012).

Reliability and Validity

The MSPSS was examined with a sample of 275 undergraduates and demonstrated good internal and test-retest reliability and moderate construct validity (Zimet et al., 1988). The MSPSS's validity and reliability were examined in 475 patients with HF (Shumaker et al., 2017). This showed excellent internal consistency with a Cronbach's alpha of 0.94 for the total instrument. In terms of validity, hypothesis testing showed that social support perceived as inadequate was a significant predictor of depressive symptoms, with more than half the participants (56%, $n=266$) describing depressive symptoms (Shumaker et al., 2017). The Arabic version of the MSPSS showed that the family, friends and significant others subscales comprised a highly reliable and culturally valid measure of perceived social support in Lebanese patients (Merhi & Kazarian, 2012).

Scoring

The MSPSS consists of 12 items and uses a seven-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). Scores for the 12 items are summed for a total score which ranges from 12 to 84; higher scores indicate more perceived support.

- To calculate mean scores for the 'significant other' subscale items 1, 2, 5, and 10 are summed, then divided by 4.
- For the 'family' subscale, items 3, 4, 8, and 11 are summed then divided by 4.
- For the 'friends' subscale, items 6, 7, 9, and 12 are summed then divided by 4.
- For the total scale score, all 12 items are summed then divided by 12 (Zimet et al., 1988).

MSPSS scores have been categorised as follows for heart failure patients: low (1 – 2.9), moderate (3 – 4.9), and high (5 – 7) (Zimet et al., 1988) (see Appendix 14 and Appendix 15 for the English and Arabic versions).

Depression and Anxiety

The hospital anxiety and depression scale (HADS) was used to assess the constructs of depression and anxiety (Zigmond & Snaith, 1983). The HADS is a widely used short self-assessment survey developed for patients with physical illness. The HADS items focus on investigation of psychological manifestations of anxiety and depressive mood. An Arabic version of this scale is available and was used in this study (Absood & El-Rufaie, 1987).

Reliability and Validity

Bjelland et al. (2002) reviewed literature that examined the validity of HADS subscales in clinical groups and community participants. Cronbach's alpha values for HADS anxiety have varied from 0.68 to 0.93 (mean 0.83) and for HADS depression from 0.67 to 0.90 (mean 0.82); this has showed good internal consistency to assess symptom severity and status of anxiety disorders and depression in physical, psychiatric and primary care settings and in the general population. The Arabic version of HADS was considered an acceptably reliable measure for detecting symptoms indicative of anxiety and depression among Saudi patients within primary

healthcare settings (Absood & El-Rufaie, 1987). Terkawi et al. (2017) tested the reliability of the Arabic version of HADS with 110 Saudi patients, showing adequate internal consistency with Cronbach's alpha for the HADS anxiety sub-scale of 0.83 (95% confidence interval [CI]: 0.79-0.88) and for the HADS depression sub-scale, 0.77 (95% CI: 0.7-0.83); thus, there was adequate internal consistency for both HADS subscales among these patients. In terms of testing the construct validity of the Arabic version of HADS, strong correlations were shown for HADS anxiety and HADS depression with the generalised anxiety disorder 7-item scale (GAD-7), and the major depression inventory (MDI), respectively (Terkawi et al., 2017).

Scoring

The HADS consists of 14 items, 7 items each for anxiety and depression. The participants rate scores on a 0–3 scale, yielding a range of 0–21 for each subscale. Higher scores indicate higher symptom frequency and severity. Scores have been classified as follows: 0–7 for normal range; scores ranging 8–10 indicate mild symptoms, whilst scores of 11–14 and 15–21 indicate moderate and severe symptoms of anxiety and depression, respectively (Zigmond & Snaith, 1983) (see Appendix 16 and Appendix 17 for the English and Arabic versions).

Medication Adherence

The medication adherence report scale (MARS-5) was used to assess participants' adherence to medications. The MARS-5 is a brief tool to assess medication adherence (Horne & Weinman, 2002). An Arabic version of this scale is available and was used in this study (Seid et al., 2023).

Reliability and Validity

The MARS-5 has demonstrated satisfactory internal consistency, as indicated by a Cronbach's alpha coefficient of 0.85 (Horne & Weinman, 2002; Ohm & Aaronson, 2006). Seid et al. (2023) assessed the validity of MARS-5 with patients with HF and reported a Cronbach alpha value of 0.85.

Scoring

The MARS-5 consists of 5 self-report items addressing common patterns of nonadherent behaviours. Participants rate each item on a 5-point Likert scale, with scores ranging from 1 = always to 5 = never. The total score for the MARS-5 ranges from 5 to 25, with higher scores indicating better medication adherence (Horne & Weinman, 2002). Most self-report adherence

scales categorise respondents into two groups of adherent and non-adherent participants. Accordingly, MARS-5 scores were categorised into a dichotomous format, distinguishing between medication adherence and non-adherence. MARS-5 scores ≥ 20 were categorised as adequate medication adherence and < 20 as inadequate medication adherence (Seid et al., 2023; Van De Steeg et al., 2009) (see Appendix 18 and Appendix 19 for the English and Arabic versions).

3.8 Data Analysis

3.8.1 Phase One Data Analysis

The interviews were audio-recorded and transcribed verbatim from Arabic to English by the researcher, who is bilingual in Arabic and English, before importing the data into a software program for analysis.

The qualitative interview data were analysed using the software package NVivo version 12 to support directed content analysis (Hsieh & Shannon, 2005). Directed content analysis can be used to confirm or expand a theoretical framework or theory (Elo & Kyngäs, 2008). Established theories or previous research can guide the formulation of the research question and offer predictions regarding relevant variables or their relationships. This approach can be used to help create an initial coding structure and identify links between codes, a process known as the deductive category approach (Hsieh & Shannon, 2005).

A deductive approach was employed to address Research Question 1: "How do patients living with heart failure in Saudi Arabia perceive and practice self-care in relation to their disease?" The analysis was guided by the Situation-Specific Theory of Heart Failure Self-Care. An a priori coding matrix was developed based on the theory's key constructs, covering the components of self-care (maintenance, management, and confidence) as well as factors influencing these behaviours. This matrix structured the initial coding process and enabled the identification of key barriers to and facilitators of self-care in line with the theoretical framework.

An inductive approach was also employed, which involved starting with specific observations or data and then developing general conclusions or theories based on those observations (Thomas, 2006). Where there is insufficient prior knowledge about a phenomenon, or if the available knowledge is incomplete, an inductive approach is recommended (Elo & Kyngäs, 2008). This approach moved from collecting specific data from patients living with HF in Saudi Arabia to analysing those data to develop new insights about how these patients perceived and practised

self-care. This approach allowed for the exploration of additional factors beyond those already established in existing literature and theories, potentially resulting in the generation of supplementary codes to further enrich understanding of the research question. Therefore, both deductive and inductive approaches were used. The deductive aspect utilised a theoretical framework, while the inductive aspect involved the active exploration and analysis of specific data to develop new insights (Thomas, 2006). NVivo version 12 software was used to conduct coding to facilitate the directed qualitative content analysis.

Using directed qualitative content analysis (Hsieh & Shannon, 2005), the first step in the analysis involved familiarisation with the data through a careful reading of the transcripts and beginning to interpret their meaning. The researcher then generated initial codes by identifying patterns within the data. Any data that did not fit into the predefined codes were assigned new codes. The next phase involved searching for overarching themes by grouping related codes and reviewing the potential themes. Subsequently, the researcher refined and reviewed these themes to ensure coherence and accuracy. The final steps involved defining and naming the themes, along with providing clear descriptions. The findings were then synthesised into a comprehensive report, integrating the identified themes and providing insights into the research question.

3.8.2 Phase Two Data Analysis

Findings from the Phase One data analysis were also used to inform the second phase of the study, which applied a quantitative methodology using survey design. The interviews revealed additional factors considered significant in comprehending the self-care dynamics of individuals with HF in Saudi Arabia. Consequently, these factors were incorporated into the Phase Two questionnaire (see section 3.7.2.1: Additional variables). Survey data were collected in Arabic then translated to English for entry into the statistical package of social science (SPSS) version 26 by the researcher, who is bilingual in Arabic and English. Survey data were analysed using the statistical package of social science (SPSS) version 26.

Firstly, descriptive statistics were used to describe the characteristics of the participants, using mean \pm standard deviation (SD), minimum and maximum values for normally distributed continuous variables such as age, and median \pm interquartile range (IQR), minimum and maximum values for non-normally distributed continuous variables. Frequencies and

percentages were used to describe categorical (nominal) variables such as gender, marital status, living circumstances and employment.

To Address Research Question 2: What is the level of self-care adherence in patients living with heart failure in Saudi Arabia? Descriptive statistics were used with participants' responses to the SCHFI (Riegel et al., 2009), provided separately for each of the self-care maintenance, self-care management and self-care confidence sub-scales.

To Address Research Question 3: What factors determine, predict, facilitate or present barriers to self-care adherence in patients living with heart failure in Saudi Arabia? First, potentially predictive variables were identified in relation to each of the four sub-questions of Research Question 3, seeking the a) personal, b) problem or disease, c) environmental or d) other factors that determine, predict, facilitate or present barriers to self-care adherence in heart failure patients. This was done by first identifying all factors reported as potentially predictive of self-care adherence in patients living with heart failure. These factors were identified from two sources: the literature review (reported in Chapter Two) and the Phase One interview data from patients living with heart failure in Saudi Arabia (reported in Chapter Four). These factors were organised into the three categories identified by the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2016) plus an additional 'Other' category denoting factors derived solely from the Phase One qualitative findings (see Table 6).

Table 6: Factors Potentially Predictive of self-care adherence in patients with Heart Failure in Saudi Arabia

Personal characteristics	Disease-related characteristics	Environmental characteristics	Other - from interviews
Age	NYHA class	MSPSS	Other health issues prevent self-care activities for heart health
Gender	CCI	Family caregivers	*Time available for self-care
*Marital status	*Mini-Cog	Paid caregivers	Get clear advice on how to do self-care
*Living circumstances	HF duration		*Comfortable with doctors or nurse
*Highest level of education	Number of hospital admissions		* Physical activities status
Perceived adequacy of income	Number of medications per day		Chief motivation for self-care
*Employment status	*MARS-5		**Opinion of internet and social media and their roles in cardiac self-care
Religion	HADS depression		
Current smoking	HADS anxiety		
DHFKS			

The NYHA New York Heart Association, the CCI Charlson comorbidity index, HF heart failure, Mini-Cog rapid cognitive impairment screening, MARS-5 The five-item medication adherence report scale, DHFKS Dutch heart failure knowledge scale, HADS Hospital anxiety and depression scale, MSPSS multidimensional scale of perceived social support.

*Variables also used in dichotomised forms: Marital status as married/single; MARS-5 class as inadequate (≥ 20) / adequate (< 20); mini- cog class as cognitive impairment (0-2)/ normal cognitive status (3-5); single/married; live alone/with others; educated/non- education; employed/non employed; do physical activities/no; uncomfortable/uncomfortable; having time/not having.

** Variables also used in categorical forms, scaled as: use it/ perceive as useful but not used/ not useful.

To identify factors to be included in regression modelling, bivariate analyses were initially conducted with the potential independent variables tabulated in Table 6, examining their

relationship with each of the three SCHFI subscale scores (treated as continuous data) as the dependent variables. The normality of distribution for all variables was assessed. For normally distributed independent variables such as age, parametric tests were used. Non-parametric tests, such as Spearman correlation coefficient, were employed for non-normally distributed and ordinal variables, including HF duration, hospital admissions in the previous year, DHFKS, number of regular medications per day, HADS depression, HADS anxiety, NYHA class, CCI and MSPSS. Mann-Whitney tests were employed for variables that were either originally dichotomous or were collapsed/recoded into dichotomised categories. These included variables such as gender, marital status, current smoking status, religion, presence of other health conditions that hinder engagement in cardiac self-care, receipt of clear advice from a doctor or nurse, presence of a family caregiver or paid carer, as well as scores from the Mini-Cog and MARS-5 assessments. Kruskal Wallis tests were utilised for categorical data (such as perceived income, chief motivations). Classes 3 and 4 of the NYHA classes were combined due to the small number of participants in each category, which would have limited the statistical power and meaningful interpretation if analyzed separately.

These preliminary initial analyses were conducted to determine the variables exhibiting an association with SCHFI subscale scores, with a significance threshold set at $P < 0.25$ (Cohen et al., 2013; Tabachnick et al., 2019). These variables were then considered for inclusion in the regression models. All variables were next tested to ensure that the assumptions for regression modelling were met.

Critical assumptions essential for multiple linear regression analysis were tested to ensure: the absence of significant multicollinearity; compliance with multivariate normality through normally distributed residuals; confirmation of no more than a modest linear correlation between dependent and independent variables; and assurance of homoscedasticity, indicating consistent residual variance across levels of independent variables.

Categorical variables with multiple response options lacked an inherent ordered structure suitable for direct entry into a regression model; these included: living circumstances, employment, perceived adequacy of income, highest level of education, the most common type of physical activity they engage in, chief motivation for self-care, participants' opinion of internet and social media for cardiac self-care, being comfortable talking with doctors or nurses, and availability of time. To address this issue, they were converted into a set of binary variables, also

known as dummy variables, where each variable was represented as either "yes" or "no". This process involved encoding each category separately as a binary variable, indicating its presence or absence. This methodology enabled the meaningful integration of these categorical variables into regression analyses, thereby facilitating the examination of their impact on the dependent variables (Cohen et al., 2013; Tabachnick et al., 2019).

The necessity to create dummy variables, particularly in categorical variables with multiple levels, escalated the total number of variables for entry into the models beyond initial expectations. This expansion in variables can have repercussions on the statistical analyses, potentially complicating the interpretation of results and introducing multicollinearity issues. Consequently, the study could have been under-powered for these analyses, meaning that the sample size might not have been large enough to detect smaller, yet meaningful effects. This risk was born in mind for this study, but the number of variables found eligible for inclusion in regression modelling did not push the required sample size beyond the number recruited.

Multiple regression analysis was then performed for each of the three SCHFI subscales as dependent variables, with statistical significance set at $P < 0.05$.

3.8.3 Triangulation and Integration of Phase One and Two Findings

The findings of the qualitative and quantitative components are presented separately in Chapters Four and Five. The triangulation and integration of these findings is then described in Chapter Six, the Discussion Chapter, and contextualised within the updated Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2022).

Triangulation of findings from different methods typically occurs during the interpretation stage of a study, after both data sets have been analysed separately (Alele & Malau-Aduli, 2023; O'Cathain et al., 2010). For this study, the process entailed comparing and validating the results, examining patients' qualitative reports of their self-care experiences alongside the quantitatively measured findings (Klassen et al., 2012). Qualitative data from semi-structured interviews detailed how participants living with HF in Saudi Arabia perceived and practised self-care in relation to their disease; quantitative data from surveys demonstrated levels of self-care adherence, associated and predictive factors. These data were triangulated by comparing and contrasting findings from the interview and the survey data. The procedural approach involved meticulously documenting each step of the triangulation process to maintain transparency and

ensure that the steps taken can be replicated. By providing a detailed account of each comparative step, the approach enhanced the reliability and validity of the findings, promoting consistency and rigor in the research. The process entailed the researcher co-locating the findings from each phase of the study into one place and considering where the findings from each phase were consistent (agreed), provided complementary information about the same issue (complementarity), or appeared to contradict each other (inconsistency or discordance), to lead to a better understanding of the research question (O’Cathain et al., 2010).

Integration in a mixed methods study is used to maximise strength and minimise the weakness of each study phase (Creswell & Creswell, 2018). In this exploratory mixed methods study, the triangulation and integration were crucial for developing a comprehensive understanding and addressing the research questions. The integration of findings was achieved by using results from the first phase of data collection, which involved semi-structured interviews, to inform the second phase, which involved surveys. This approach allowed the researchers to explore additional factors beyond those already established in existing literature and theories. Survey items were developed based on insights gained from the interview data. Factors identified by Phase One participants as influential in self-care decision-making for individuals with HF in Saudi Arabia were included in the survey, ensuring that the study addressed relevant and context-specific issues. Through combining different types of data, the researchers could explore new areas and context-specific information; hypotheses could be generated that could be tested in future studies (O’Cathain et al., 2010). This approach was useful for this health research, as it enabled development of understanding both in terms of statistical trends and how participants perceived their practices and their experiences, which may lead to more effective health strategies to improve health and self-care for Saudi people living with HF. A matrix table was used to show, in detail, how triangulation and integration of the study findings were conducted.

3.9 Ethical Considerations

The research was conducted in accordance with the ethical guidelines and standards outlined in the National Statement on Ethical Conduct in Human Research (NHMRC, 2023) and the Australian Code for the Responsible Conduct of Research (NHMRC, 2018). The National Statement on Ethical Conduct in Human Research is the national Australian guideline that

provides a framework for researchers and institutions to ensure ethical conduct in research involving human participants.

3.9.1 Ethical Committee Approvals

Ethical approvals for the study were obtained from the Ethical Research Committee from the research centre affiliated with the Heart Centre at KASH in Saudi Arabia (See Appendix 20: Ethical approval letter from the Ethical Research Committee of the research centre affiliated with the Heart Centre at KASH). This included permission to access patients' medical files to assess patients for their eligibility criteria. Ethical approval was also obtained from the Human Research Ethics Committee of the University of Technology Sydney (HREC Approval No. ETH21-6435) (See Appendix 21: UTS ethical application and the approval letter)

3.9.2 Informed Consent Process

Approval was obtained from the Ethical Research Committee of the research centre affiliated with the Heart Centre at KASH to access patients' medical files to assess patients for their eligibility criteria ahead of their provision of consent to participate in this study. Patients who met the inclusion criteria were provided with information about the study and invited to take part. The informed consent process requires that participants have sufficient understanding of the research and any potential implications arising from it (Xu et al., 2020). Accordingly, the researcher provided information to potential participants about the study verbally and supplied a Participant Information Statement (refer to Appendix 22 and 23 for Participant Information Statement for Phase One and Two respectively), which included an explanation of the research aims and the methods of data collection.

Those interested in participating signed the consent form (see Appendix 24). In Phase One (the interviews), individuals who lacked literacy or had impairments that prevented them from signing a consent form were given the option for audio-recorded witnessed verbal consent, considering that it was not uncommon to encounter individuals who could not read or write.

3.9.3 Participants as Autonomous Decision Makers

Participation was voluntary and participants could at any time opt not to answer a question, pause the interview process or withdraw from the study at any stage up until data analysis without giving any reason. This was explained to participants both verbally and in the Participant Information Statement.

3.9.4 Benefits Versus Risks

The researcher explained to participants that they would not receive any benefit, payment or compensation for participation. However, by participating, participants had an opportunity to express their experiences of their health and selfcare and identify the factors that were important to them in relation to their self-care with HF.

The researcher acknowledged that while participants may welcome the opportunity to talk to an independent person about their experiences of living with chronic disease, they may be emotionally affected by remembering or anticipating traumatic events. It may be a challenge, or even distressing, to talk about personal beliefs and behaviours regarding medically prescribed treatments, especially for people who are living with end-stage disease. This situation may incur an increased risk of patients feeling upset while discussing their current lifestyle and limitations.

Participants were assured that if they experienced distress, felt confused or decided to discontinue their participation at any time during the interview, they were free to leave. Furthermore, the researcher remained attentive to the potential for distress and, if alerted to this, the interview was paused, and the participant was consulted about their preferred course of action.

To deal with a distressed participant, the researcher adhered to following distress protocol (Haigh & Witham, 2013):

If the researcher sensed or anticipated mild distress in the participant, an offer to pause questions, omit questions, defer, delay or terminate the interview or to move the participant to a quiet area with the offer of a debrief would be considered. The offer could be made to resume the interview if the participant felt able to carry on. Local support services could be offered.

If the researcher sensed or anticipated more serious distress in the participant, all the above would have been done plus the participant encouraged to contact their physician or clinical social worker to support them. With participant consent, the researcher would contact a member of the healthcare team treating the participant for further advice/support. The researcher would consider, and seek permission, to call again the next day to check in that they are ok.

Every precaution was taken to make research a safe experience for all participants. It was not anticipated to cause more than mild or moderate upset, and the researcher was sensitive to the participant's response and responded to early signs of distress (Nasreddine et al., 2005).

3.9.5 Privacy, Confidentiality and Data Storage

The researcher ensured the privacy and confidentiality of the study participants throughout the research. The data collection methodology employed in the study consisted of a mixed methods approach, incorporating both semi-structured interviews and questionnaires. Predominantly, data were gathered through audio recordings and directly entered into software including NVivo version 12 and SPSS for Windows version 26.

Maintaining participants' privacy was a guiding principle that was applied at all stages of the research. Interviews with participants were conducted in private locations such as empty examination rooms or offices. This approach was designed to foster an environment where participants felt comfortable sharing their personal beliefs and behaviours related to health. Additionally, participants were given the option to have questionnaires read aloud in private rooms, which helped individuals with low educational attainment, visual impairment, or fatigue to understand the questions while maintaining their privacy.

A related and equally important principle was that of confidentiality. Throughout the study, the identities of the participants were kept confidential. All participants were allocated a code number, which was used when referring to participants in the analyses and all reports and chapters of this thesis (e.g. respondents have been identified by participant (p) number). No identifying content was transcribed from the interview data, and participants were not asked to provide their names during the interviews; no identifying information was collected on the questionnaires. Participant information remained confidential, and they were not identified in any published material.

Regarding the storage of identifiable or re-identifiable data, participants' personally identifiable information such as names, birth dates, and hospital file numbers were securely stored as de-identified data until the data analysis phase was completed. Each participant was assigned a unique study code number, and the file linking this code to individual participants' personally identifiable data was stored separately from the actual data files containing participant clinical data or responses. Furthermore, hard copies of data including paper consent forms, questionnaires, and transcripts were stored in a locked cabinet to ensure restricted access. Only the research team was granted access to these physical materials. Additional security measures, such as physical locks, were implemented to safeguard identifiable or re-

identifiable data. The file that linked code number to individual participant was electronically deleted once all analyses were completed, and the data will be stored in a permanently de-identified form for the duration required by the Ethics Committee (5 years).

These measures were put in place to uphold the confidentiality and privacy of participants throughout the research process.

3.9.6 The Researcher's Position

An essential ethical consideration is that the researcher's position within the study should be transparent. Transparency includes recognition of any familiarity and relationships that might exist between the researcher, healthcare professionals at the study site, participants and any potential influence or biases on the interpretation of findings (Reid, Brown et al. 2018).

The researcher's interest in the research study was ignited, inspired and motivated by working in intensive care during my internship and subsequently as an assistant, lecturer assistant and lecturer for six years. I finished my nursing studies in Saudi Arabia as a general nurse, then during my master's study in Australia, I specialised in the study of chronic health conditions. The researcher's interest lies in enabling patients with chronic disease to take care of themselves, which alleviates their suffering and supports them to deal with and accept their disease, in addition to relieving pressure on hospitals, treatments, costs and medical staff. During my clinical practice, I noticed that diabetes mellitus, hypertension, HF and renal failure were the most common chronic diseases that caused patients' entry into the emergency and intensive care departments of Saudi Arabia. However, the researcher noted that a large percentage of patients with HF were middle-aged. The burden of HF among middle-aged patients in Saudi Arabia poses a considerable strain on the healthcare system, given the rising prevalence of cardiovascular risk factors. Middle-aged individuals in the country often grapple with conditions such as diabetes, hypertension, and obesity, contributing to an increased incidence of HF cases. The healthcare system faces challenges in providing comprehensive and sustained care for this demographic, requiring significant resources for diagnosis, management, and ongoing monitoring. In this context, the importance of self-care practices cannot be overstated. Encouraging middle-aged patients with HF to actively engage in self-care, including medication adherence, dietary modifications, regular exercise, and monitoring of symptoms, is crucial for improving outcomes and reducing the burden on the healthcare system. Empowering individuals

to take charge of their health can reduce mortality and readmission rates, enhance overall well-being and quality of life, mitigate the progression of HF in these patients (Clark et al., 2015; Kessing et al., 2017), and contribute to a more sustainable and efficient healthcare approach.

In term of reflexivity, the researcher was aware of the risk that her social position and emotional responses could influence their interpretations of participants' accounts. When applying qualitative research, it is necessary to use reflexivity and the researcher's recognition of the participants and the context of the research (Reid et al., 2018). Reflexivity is recognising that the researcher and the research of the study are mutually exclusive (Attia & Edge, 2017). Therefore, a reflexive position required consideration of the fact that the researcher had clinical experience as a nurse and personal experiences, beliefs and attitudes that derived from the culture and context shared with the participants; that the researcher was aware of ethical considerations, sought to avoid any possibility of coercion or undue influence, and worked to ensure that the participant's voice was heard. Table 7 sets out the possible preconceptions recognised by the researcher and their possible influence on interpretations of study findings.

Table 7: Preconceptions Recognised by the Researcher and Their Possible Influence on Data Interpretation

Preconceived ideas	Potential impact on the interpretation	Engagement in reflexivity
Clinical experience as a nurse.	The interpretation could be influenced by the researcher's clinical experience.	The researcher recognised the likelihood of preconceived ideas arising from her nursing clinical experience, understanding the potential influence on the study's interpretation. Acknowledging the impact of her background, the researcher actively took steps to diminish any bias that could compromise objectivity in interpretation. This heightened awareness led to a thorough and reflexive approach, ensuring a critical perspective in analysing findings and minimising the impact of clinical experience in the final interpretation. The researcher was also mindful of potential bias due to shared culture with participants, recognising the risk of making assumptions that could affect interpretation. This awareness guided the researcher in adopting a cautious and reflexive stance, actively working to prevent undue influence during conversations. The goal was to ensure that the researcher's familiarity with participants' culture did not compromise the study, and interpretations were based on a comprehensive examination of the collected data. The researcher, being aware of ethical considerations, diligently avoided coercion or undue influence, prioritising transparency to ensure the participants' voices were heard.
Potential bias due to the culture and background shared with the participants.	The risk that the researcher would make assumptions because of her familiarity with the participants' cultures and their backgrounds that might influence interpretation during the interviews.	

3.10 The Methodological Rigor of the Study

In qualitative research, rigor or trustworthiness refers to the degree of confidence that can be placed in the data, interpretation, and methods that were used to ensure study quality (Connelly, 2016). Lincoln and Guba (1985) describe criteria to judge if the research is rigorous, which include credibility, transferability, dependability, and confirmability.

Credibility means confidence in the truth of study findings, much like the internal validity of quantitative research. The techniques used to ensure credibility for this study were prolonged engagement, persistent observation (to the extent that this was possible), examining referential adequacy to test preliminary findings and interpretations against raw data, and thorough member checking of findings to test the interpretations with the participants. For this study, the member checking of findings was done for semi-structured interviews through sending the interview transcripts back to participants. For the survey, use of the interview data supported the credibility of the conceptual base of the survey tool.

Transferability means the ability to generalise the inquiry and thus, that the findings of the study are applicable to other contexts, much like the external validity of quantitative research. The researcher ensured the study's transferability by giving thick, rich and detailed description of the context, participants and location of study.

Dependability means the study findings are consistent and reproducible, much like the reliability of quantitative research, and it can be ensured through auditing and providing a constructed reality of the participants' experiences and checking that the research process is coherent, identifiable, and clearly documented. This can also be done through auditing and member checking of the findings of the participants' experiences, as noted above.

Confirmability means that the researcher's interpretations and findings are clearly derived from the data, which requires that the researcher clarify how conclusions were reached, how interpretations were achieved, and reflexivity is used to isolate any potential researcher bias, motive, or interest. Assumptions were identified to achieve researcher reflexivity (Table 6), due to the researcher's familiarity with the participants' cultures and backgrounds that had potential to influence interpretation during interviews. According to Guba and Lincoln (1989), confirmability is demonstrated when credibility, transferability, and dependability are all achieved.

In the conducted survey, methodological rigor was upheld through a meticulous approach to ensuring both validity and reliability of the quantitative component. Firstly, the rigor of the quantitative component was assured by using instruments that had all demonstrated validity and reliability in their original language versions. These instruments were also available in Arabic, and the rigor of the translated versions had previously been established. Following their compilation into the survey for Phase Two of this thesis study, the content validity of survey items was further checked through expert reviews and pilot testing, ensuring a comprehensive coverage of the intended constructs (Younas & Porr, 2018). Construct validity was confirmed using correlations with related measures, ensuring accurate measurement of the targeted theoretical constructs. Conducting a pilot test by asking a few people to read the survey questions before administering them to a larger group of participants is an effective strategy to enhance the rigor of the study. This process, known as pilot testing or pre-testing, allows researchers to identify any potential issues with the survey instrument, such as confusing wording, ambiguous questions, or missing response options. In this study, three participants and two nurses reviewed the survey questions in order to assess their clarity and comprehensibility for participants. Internal consistency, measured through Cronbach's alpha, further ensured that items measuring the same construct were consistently correlated (Streiner et al., 2015).

Sampling techniques were employed to guarantee the representativeness of the sample, and statistical analyses, including appropriate inferential methods, were applied to the collected quantitative data. Ensuring the confidentiality of participants' responses and explicitly informing them that their answers would remain undisclosed outside the research team was crucial for fostering trust and encouraging candid and open participation in the survey. This commitment to confidentiality not only upheld ethical standards but also enhanced the rigor of the study by promoting a safe environment for participants to share their perspectives without fear of exposure or judgment. The study adhered to ethical considerations, obtaining informed consent and safeguarding participant confidentiality (Xu et al., 2020).

Overall, the survey's quantitative component was methodologically robust, contributing to the reliability and validity of the study's findings.

Chapter Four: Phase One Results

4.1 Introduction

This chapter sets out the results of Phase One of the study, specifically focusing on the qualitative findings. The aim of this analysis is to provide insights into the perceptions and self-care practices of patients living with HF in Saudi Arabia, addressing Research Question 1: "How do patients living with HF in Saudi Arabia perceive and practise self-care in relation to their disease?". The qualitative approach employed in this phase allowed the exploration of the subjective experiences and perspectives of individuals dealing with HF in the Saudi Arabian context.

The analysis of the interview data identified six main categories: 1) impacts of HF on everyday life, 2) knowledge of HF, 3) HF self-care practices, 4) HF self-care deficits, 5) HF self-care facilitators, and 6) HF self-care barriers. The Situation-Specific Theory of Heart Failure Self-Care was used as a framework for the data analysis, providing a foundation of established constructs to build on with Saudi Arabian data. Respondents have been identified in the report by participant (P) number to preserve confidentiality.

4.2 Phase One Participants

Interviews were conducted from April 2022 to September 2022, with each interview lasting approximately 30 to 45 minutes per participant. All interviews were conducted in Arabic, digitally recorded, and professionally transcribed into English. A total of fourteen participants were involved, consisting of four women and ten men. The ages of the participants ranged between 37 and 77 years, with a mean age 54.6 years. All participants were married. Ten participants (71.4%) were male, with mean age 58 years. One male participant could not read or write, while (50%) had completed primary, secondary or high school level of education, and four had attained a diploma or degree. The four female participants had a mean age of 46.25 years, and all had achieved a secondary or high school educational level. The characteristics of the Phase One participants are detailed in Table 8

Table 8: The Characteristics of the Phase One Participants (n = 14)

Participants*	Age	Gender	HF severity	Marital status	Highest level of education
Participant a	56 years	Male	NYHA II	Married	Secondary school
Participant b	48 years	Female	NYHA II	Married	Primary school
Participant c	37 years	Male	NYHA III	Married	Bachelor's degree
Participant d	51 years	Male	NYHA I	Married	Diploma
Participant e	77 years	Male	NYHA I	Married	Primary school
Participant f	59 years	Male	NYHA I	Married	Bachelor's degree
Participant g	63 years	Male	NYHA II	Married	Could not read or write
Participant h	64 years	Male	NYHA I	Married	Secondary school
Participant i	53 years	Male	NYHA II	Married	High school
Participant j	45 years	Female	NYHA I	Married	Secondary school
Participant k	57 years	Male	NYHA III	Married	High school
Participant l	41 years	Female	NYHA II	Married	High school
Participant m	51 years	Female	NYHA I	Married	High school
Participant n	63 years	Male	NYHA II	Married	Graduate degree

*Participants are identified by their assigned participant (p) letter or number to protect their identities.

4.3 Category 1: Impact of Heart Failure on Everyday Life

Interviews with participants confirmed the impact of their HF on various aspects of their daily lives, including physical, social, psychological, spiritual, and employment status.

4.3.1 Physical Impacts

The physical ramifications of HF, as reported by participants, encompassed symptoms including fatigue, shortness of breath, swelling of the extremities, disrupted sleep, and challenges in their sexual lives, all of which significantly affected their daily routines.

Fatigue was particularly prevalent, impeding routine activities and necessitating frequent rest. Participants often felt they were no longer their usual selves, finding even simple tasks like climbing stairs difficult. Some had to make lifestyle adjustments, such as relocating to avoid stairs. One participant expressed:

I'm not fit, I mean, young men my age, you know, they can move around and play sports with fitness. But me, I am sick with the heart, sometimes I get tired when I walk only two steps, sometimes when I go to my car, so I have to sit for half an hour and rest before completing. (P.3)

Shortness of breath and swelling of the extremities were frequently reported by participants. Symptoms such as trouble breathing, a feeling of suffocation, chest tightness, a muffled sensation, and difficulty breathing are key indicators of worsening heart function. These symptoms were often experienced during daily activities, leading to significant limitations in physical exertion. Swelling of the extremities, particularly in the legs, ankles, and feet, was often linked to fluid retention caused by poor circulation. Examples of what participants expressed concern about:

"I am afraid of experiencing shortness of breath or a feeling of suffocation. When I feel discomfort in my chest, I feel that I need to go to the hospital." (P.4)

"I don't have any major problems, but sometimes I feel a tightness in my chest and similar symptoms." (P.8)

"Sometimes I feel like my fingers are swollen, and I have a muffled sensation in my chest." (P.8)

"Yes. sometimes my leg swells, likely as a side effect of the medication." (P.13)

Some participants reported disturbances in their natural sleep-wake cycles due to HF. They struggled with inadequate nighttime sleep, which led to daytime napping and subsequently disrupted their typical daily routines. One participant remarked:

The best sleep is to sleep in the evening. As in Holy Quran: "And made the night a cover and made the day for livelihood." I feel that if I sleep at night, I will be better in the day. (P.6).

Participants also noted a significant impact on their sexual lives and relationships with their spouses after the experience of HF. They indicated that the nature of their marriage had changed, and they perceived differences in marriage relationships compared to the past. One individual shared:

"My life with my wife has changed. I mean the circumstances of the marriage (sexual life) and I feel I am not the same as before." (P.4).

Participants avoided elaborating on their sexual lives and relationships due to cultural considerations, which influenced their willingness to share their experiences openly. In the above quote, the participant's use of the phrase "*I feel I am not the same as before*" indicates a personal internal transformation or perhaps a shift in identity or self-perception, likely due to changes in their marital relationships and sexual life.

4.3.2 Psychological Impacts

The psychological impact of HF was profound, with the majority of participants grappling with negative emotions such as anxiety, anger, diminished motivation, depression, fear, tension, changes in body image, lowered self-esteem, and denial. Some participants were concerned that their heart might stop while they slept.

"Sometimes I sit until the sun comes up, I can't sleep. I'm afraid I won't wake up." (P.4)

Accepting the diagnosis of heart failure was challenging for certain participants, leading them through phases of denial, anger, and distress, especially when their heart condition swiftly progressed to heart failure. This rapid progression intensified the emotional journey, making acceptance more arduous.

"To be honest, when I was diagnosed with heart disease, I couldn't believe it, because it happened suddenly, it didn't cross my mind, so I was very nervous and stressed." (P. 12)

Some participants found that the psychological impact of being diagnosed with heart failure significantly hindered their confidence to engage in physical activities. Furthermore, the decrease in physical ability negatively affected self-esteem and overall confidence. One participant remarked:

By God, I think most of the changes are psychological. So far, I'm not convinced that I have heart failure, or that I've less physical strength than others. I can make more effort than healthy people, but the issue is psychological, and I'm afraid of the consequences.
(P. 4)

Their emotional struggles were closely tied to the constraints imposed by their heart failure, encompassing changes in physical capabilities, reliance on medications, the presence of heart failure symptoms, a persistent fear of mortality, worries about burdening others, and concerns for their family's wellbeing. These factors significantly contributed to their emotional distress.

4.3.3 Social Impacts

Following their diagnosis of heart failure, several participants noted a tendency to withdraw and isolate themselves from social interactions. Many others redirected their focus towards strengthening familial bonds, fulfilling family needs, and prioritised spending more time at home with their families rather than engaging in social activities.

"By God, I wish to always sit with my children. I mean, before, I never sat with them, and days went by that I didn't even see them." (P. 8)

Additionally, some participants limited their social engagements due to concerns about experiencing a heart-related event or imposing burdens on others. This fear affected their willingness to partake in recreational outings, travel beyond their local area, or venture into remote settings with friends, particularly in locations far from hospitals or healthcare facilities, as they worried about the potential for emergencies.

"I was a lover of going to the wild for two days, me and my colleagues. But these kinds of trips now, almost no, I'm afraid I will become a burden on the people with me." (P. 11)

Participants expressed hesitancy about engaging in social activities due to the repercussions of their illness and its treatments. Some individuals experienced aggravated swelling in their

lower extremities following extended drives, while others hesitated to leave their homes due to the side effects of prescribed diuretics, which led to frequent bathroom visits. These physical effects contributed to their reluctance to participate in social outings.

4.3.4 Spiritual Impact

The spiritual impact of heart failure was evident among participants, who recounted transformative changes in their lives following the diagnosis. They highlighted the journey of discovering new meaning and redefining personal goals. One participant shared:

"I became more interested in my family and didn't go or come, just staying at home."
(P. 12)

Having heart failure prompted participants to cultivate a sense of gratitude, embrace life more fully, and develop resilience.

"I tell you that it motivates me to move on and gives me strength to persevere in life as long as I breathe, walk, and move" (P. 4).

4.3.5 Impact on Employment

Some participants disclosed that they had to retire early due to heart failure and the accompanying symptoms. This shift was necessitated by the increased need to focus on self-care, significantly impacting not only their daily routines but their entire lives.

"So, I will prepare and cook food for myself. I was linked to the job, but now I am retired."
(P. 4)

However, the ramifications of job loss and retirement extended to psychological effects, with some individuals expressing a sense of longing for their former work and the life they had enjoyed prior to these changes.

"I loved my life and I loved my job, until I was diagnosed with heart disease and my life changed three years ago." (P. 3)

4.4 Category 2: Knowledge of Heart Failure

During the interviews, participants conveyed various beliefs about the causes of their heart failure. Many expressed lay understandings, attributing the condition to psychological elements like stress, depression, anger, and unforeseen life events. Others linked it to physiological factors

including inadequate sleep and excessive work. A smaller subset attributed their heart failure to lifestyle factors, specifically, lack of exercise and unhealthy eating habits.

"Yes, it is possible that the types of eating [affect the heart], if one does not care what he eats. I call it an eating disorder" (P. 6).

In contrast to the above examples of lay understandings of disease, where some participants attempted to understand their disease without ready access to medical information, other participants did have some accurate knowledge, and understood, for example, how heart failure developed, heart failure symptoms, how diuretic treatment worked and what was required of them for effective self-care.

Some participants were able to link their improved symptoms to their adherence to medications and self-care.

"Previously, when I travelled a long distance by car, when we got out of the car, my legs were swelling, and after a while [the swelling] leaves.... not now, because I'm on diuretics now." (P. 9)

4.5 Category 3: Heart Failure Self-Care Practices

Participants engaged in self-care practices for heart failure, which included seeking information about their disease, adopting a healthier diet, exercising, maintaining a balance between work and rest, quitting smoking, establishing a good sleep routine, adhering to medication regimens, following healthcare providers' advice, not missing appointments, and avoiding stress.

4.5.1 Information Seeking

Some participants actively sought knowledge to improve their health by gathering information about their condition and self-care. They engaged in reading relevant books, watching health-related programs on television, and conducting online research. This proactive approach enabled them to understand their medications including their effects and potential side effects, explore heart-healthy dietary practices, and recognise the significance of regular exercise for their overall well-being.

I became interested in finding out, searching, watching and reading especially, oh, about the causes of diseases. Always I watch videos about doctors who talk about these causes

and things. Like a lack of vitamins like this, about nerves, about blood, about any concern, anything related. (P. 6)

4.5.2 Adapting to a Healthier Diet

Many participants emphasised healthy eating as a fundamental self-care practice. They adhered to a low-salt diet and consciously avoided canned foods or fast food. Most described their dietary habits as balanced, reducing or eliminating fatty foods, sugars, high-fat milk, and fast food, while increasing their consumption of salads, soups, fruits, vegetables, whole grains, fish, and lean meats. This emphasis on dietary choices was especially apparent in participants managing comorbidities such as diabetes. For some, maintaining a commitment to a healthy diet was so important that they avoided attending social events where dietary choices might be challenging.

You know at the time of meetings, everything is served, sweets of all kinds, and fatty eating and popular dishes such as kabsaat and manasif meat and everything that is delicious, and you should not eat it, so it is better not to go from the beginning. (P. 9)

Refusing food is considered impolite, which can pose a significant challenge for individuals with HF who must adhere to strict dietary restrictions, such as limiting salt or fluid intake. These individuals may feel pressured to accept food or drink offered during social gatherings, even if it contradicts their prescribed diet, in order to avoid offending their hosts or appearing impolite.

4.5.3 Doing Exercise and Achieving a Balance Between Work and Rest

Several participants shared their efforts to maintain regular exercise routines. Some mentioned walking for around half an hour or more daily, whether outdoors on a farm, in a park, or along a designated walkway. Others exercised by using a treadmill at home, engaging in household tasks, or walking for errands. These individuals recognised that feeling fatigued was a normal aspect of living with heart failure, particularly during physical activities or work. To manage this challenge, they sought to strike a balance between activity and rest, moderating their level of exertion and incorporating periods of rest as needed.

“No, on the contrary, I feel better while I am walking, and I take rest a little when I get tired.” (P. 1)

4.5.4 Quitting Smoking

The majority of participants recognised the significance of quitting smoking for heart health, with nearly half affirming that they had successfully stopped, whether it involved smoking shisha [a hookah] or cigarettes. One participant remarked:

I stopped smoking. No shisha or anything possible. I had a noise in my chest, wheezing, and I would snore while sleeping at night. Oh, thank God, it is now over. Yes. As you can note, there is no noise, my chest is clear. (P 11)

4.5.5 Setting a Good Sleep Routine

Getting adequate sleep and maintaining an early bedtime were self-care practices emphasised by the majority of participants. One individual shared:

“Now I have to sleep and rest for a certain number of hours, I feel like the more hours of sleep, the more I feel comfortable when I wake up.” (P. 6)

4.5.6 Adhering to Medication Regimens

Participants recognised the paramount importance of adhering to their heart failure medications as a key aspect of their self-care. Some shared their strategies to maintain consistency, such as keeping medications easily accessible, linking them to mealtimes, or setting mobile alarms. Additionally, part of their self-care regimen involved actively managing and minimising medication side effects, for example, performing blood tests and monitoring vital signs, particularly blood pressure, as a means to prevent and mitigate any adverse effects resulting from their medications.

“Almost because of the medication, my potassium level is affected, and I have to check it (blood potassium level) every once in a while.” (P. 14)

4.5.7 Following the Healthcare Providers' Advice and not Missing Appointments

Participants reported that listening carefully to healthcare providers and attending scheduled appointments were important self-care practices. They reported that following medical advice closely, asking questions when unsure, and maintaining regular checkups helped them manage their condition more effectively. One participant responded when asked if they had any advice for a new patient:

“Heart patients should not be afraid and should always follow the doctor’s advice. Remember, as God Almighty says, “Seek, my servant, and I will assist you.” (P. 9)

One participant answered, when asked what he was doing to take care of himself:

Medications are the most important thing. I stay away from things I can't tolerate. I've been told that walking is good, so I try to do that. I also pay attention to my diet and make sure to attend my doctor’s appointments. (P. 5)

4.5.8 Avoiding Stress

Participants frequently linked their heart problems to stress and emphasised the importance of avoiding stress and anxiety in managing their heart condition. Many recognised the critical role mental health plays in averting heart events. To support their efforts, they consciously avoided situations that could potentially induce stress or conflict, such as avoiding arguments or competitive activities, prioritising their mental well-being to protect their heart health.

In the past, we would play games like Baloot, Hind, and football, but in the last three years, I stopped all of these activities. Praise be to God, and as a result of that, I noticed myself getting away from stress. (P. 9)

One participant talked about his success in changing his personality and becoming a calmer person.

“After having heart failure, I changed completely. I used to be nervous and get irritable and impatient quickly. I mean, I would get angry in maybe seventy percent of situations.” (P. 6)

4.6 Category 4: Self-Care Deficits

While some participants sought to improve their health and prevent the HF complications through engaging in self-care activities, noticeable deficits in self-care were evident in several areas. These included nonadherence to medication regimens, daily weight checks and a low-sodium diet, and continuing to smoke.

4.6.1 Lack of Adherence to Medications

Although all participants appreciated the importance of taking HF medications regularly, some struggled with adhering to their prescribed regimens. In some cases, participants demonstrated lack of clear understanding regarding medication adherence. For example, one

participant believed that as long as they were taking the prescribed dose each day, even if not at the prescribed time, they were adhering to their medication schedule.

Sometimes medicines, for example, I can't take them on time, I mean, for example, the pills that I should take in the morning, I usually take them when I wake up, even if it was in afternoon. I mean, I take them regularly, I don't miss any dose. (P. 3)

Another participant discontinued their prescribed HF medications without consulting a doctor, believing optimistically that they might no longer be required. This participant explained:

I decided by myself to stop medications and to see what would happen if medications were discontinued, to examine myself, will I have any complications or anything, so I stopped taking medications for three days. Frankly, I got tired. Yes. I got water, got uh, like, swelling like this. So, I went back to the treatment. (P. 9).

4.6.2 Lack of Adherence to Daily Weight Checking

The majority of participants appeared to lack an understanding of the purpose behind monitoring or reducing their weight, as advised by their healthcare providers. None of them indicated that regular daily weighing was undertaken to track potential fluid accumulation. Even though some had scales at home, they didn't incorporate daily weight measurements into their routines. While weight checks were part of routine assessments during their clinical visits, there appeared to be a lack of communication between clinic nurses and participants regarding the results or any necessary actions in response to weight assessments.

"I do not check my weight, unless I am visiting the doctor." (P 4)

"I notice that I have gained weight over last three years. My weight used to be in the sixties, but now, I feel like I have surpassed seventy." (P. 3)

4.6.3 Non-adherence to a Low-Sodium Diet

When asked about their dietary habits, none of the participants initially acknowledged the importance of following a low-sodium diet. However, upon further probing by the researcher, most participants admitted that adhering to a low-sodium diet presented challenges. They explained that they did not adhere to a specific low-sodium plan because it would require them to eat differently from other household members.

"No, by God, we eat same food at home. I mean, there is no specific food." (P. 2)

"No, I tried to change my diet at beginning, but I could not continue." (P. 14)

4.6.4 Smoking

Some participants continued smoking despite being aware of its harmful effects. While about half of the participants had successfully quit smoking, others faced difficulties in maintaining abstinence. These participants had attempted to quit several times but were unable to sustain it. Although some participants couldn't stop smoking entirely, they managed to reduce the number of cigarettes they smoked.

I tried and failed. I tried to reduce it to ten cigarettes a day, but I could not quit smoking permanently. I went to the clinic, by God, I took the pills, and I finished the course with no benefit. I go on smoking, I put up stickers from here and I go on smoking from here. It's no use. (P. 4)

4.7 Category 5: Self-Care Facilitators

Several personal, disease and environmental factors were revealed to facilitate self-care practices among participants. Personal factors included individual motivations, religious beliefs, financial status, education and knowledge, and time availability. Disease-related factors included benefits from medications. Environmental factors encompassed support from family support, culture and friends' support, access to social media, accessibility and affordability of the healthcare services, and the availability of recreational facilities.

4.7.1 Personal Factors

4.7.1.1 Individual Motivation

Most participants believed that the key factor in successful self-care was personal motivation. They felt motivated to continue self-care practices when they experienced tangible benefits from treatments and observed improvements in their symptoms and overall health condition. Comparing their improved health status with their previous condition reinforced their commitment to their treatment regimen. Additional motivating factors included a love for life, the desire to enhance their quality of life, and the goal of preventing adverse health events.

"I think that if a person loves his life that leads to self-care. To love life is the motivation for self-care, isn't it?" (P. 3)

"But I tell you that it [being diagnosed with heart failure] motivates me to move on and gives me strength to persevere in life as long as I breathe. Yes, it is correct. I love life" (P. 4).

In addition, participants expressed other motivating factors that facilitated their self-care, stemming from their desire for wellness, the pursuit of happiness in life, and the responsibility of caring for their family.

" My family, I take care of my health for my family first and then for myself." (P. 4)

4.7.1.2 Religious Beliefs

Most participants reported that their religious beliefs supported their self-care by providing reassurance and motivation, alleviating negative feelings such as the fear of death.

Praise be to God, we are all believers, whether sick or not. Of course, we must perform ablution, we must perform ablution and prepare ourselves for our minor death before we sleep. Praise and thanks be to God, I live my life from the best it can be. I mean, far from any such fear, thank God, I mean, this helped me a lot, reassured me. (P. 11)

"For example, one thinks that it is possible to anger God by neglecting oneself. For me, if suicide was permissible, then I would commit suicide. Surely, it [religion] has a big, big role" (P. 3).

Several participants reported that their religious practices enhanced their self-care routines. These practices included daily praying, which involved full-body movement, walking to and from the mosque five times a day, participating in the Hajj pilgrimage with its associated physical activities, and fasting for a month, which they believed helped purify the body of toxins for an entire year.

"I have come from Hajj. I walked in al Hajj a lot. And I am going to rest for these next days." (P. 14)

4.7.1.3 Financial Security

Financial security emerged as another factor facilitating self-care. Participants with financial stability reported experiencing less psychological distress, which enabled them to engage more effectively in self-care practice by affording medications and following up treatment plans.

"By God, I am able to do anything, because everything is available, and the treatment is also free. I get it from the hospital or clinic, the income is enough for me, thank God." P. 8

"Look, the main obstacle for man, especially in time, is the material [money]. Of course, we all know that since a person has money, he is able to provide for at least seventy, eighty percent of psychological comfort." (P. 11)

4.7.1.4 Education and Knowledge

Participants with a higher level of education were generally more knowledgeable about self-care practices for heart failure and were more actively engaged in these activities. Education facilitated self-care by enabling participants to read and learn about effective practices, seek medical help, and then assimilate information into daily practices. The following excerpt from a participant highlights the significance of education and knowledge in self-care.

"I expect that the more educated one is, the healthier they are. As he can read and write and understand and does not need someone to tell him what he should do." (P. 5)

Participants appeared to adhere better to self-care practice when they clearly understood the benefits and importance of the self-care activities, often facilitated by education provided by their medical team. This suggests that it was not merely a higher level of education that mattered, but rather targeted education about their specific disease that enhanced their self-care engagement.

"The things [medication side effects] that I can bear, as long as I know that they are beneficial." (P. 6)

4.7.1.5 Time Availability

Many participants linked self-care to having free time, particularly in retirement. They noted retiring from work allowed them to enhance their self-care practices in several ways, including dedicating sufficient time to physical exercise, adhering to a healthy diet, and consistently following their medication regimens.

"Now, I am preparing a small kitchen. So, I will prepare and cook food for myself. I was linked to the job, but now I am retired. I have no problem with making my own kitchen." (P. 4)

What prevents me from taking care of my health, then there are no things that prevent me. The possibilities are wide open. However, some individuals may not prioritise their health or do not care, but what is the reason, if we say that the one potential explanation could be a perceived lack of time. Now after my retirement, I have time to focus on and address my health needs. (P. 6)

4.7.2 Disease or Problem-Related Factors

4.7.2.1 Medication Benefits

Some participants highlighted the benefits they experienced from their medications, which reinforced their commitment to continue taking them. Participants also cited the absence of side effects as a key factor in adhering to their medication regimens, and, consequently, their overall self-care practices.

“Now I feel my breathing became a little normal and I’m not struggling for breath.” (P. 4)

4.7.3 Environmental Factors

4.7.3.1 Family Support

The majority of participants praised the role of the family in facilitating self-care. They acknowledged the contributions of spouses, children, or siblings in preparing healthy meals, administering medications on time, or reminding them to take their medications. Family members also assisted with monitoring blood pressure, purchasing medications, and accompanying participants to follow-up appointments. One participant who had experienced a stroke recently stated that he probably would not have gone to the hospital without the support of his family during that critical moment.

My wife, she is always watchful, I am a kind of person who neglects treatments. She always fights with me, I mean, she is sensitive to my medications and what I eat, for example, the quality of food, she ensures as much as possible the food is healthy by trying to make a balanced meal. (P. 14)

The family also supported participants psychologically. The mere presence of family around them was perceived as a source of comfort, and their attentiveness heightened the participants' awareness of the importance of attention to self-care. Families made efforts to create a calm

environment, refraining from engaging in arguments or causing distress, which further facilitated the participants' focus on their health and well-being.

"I am a nervous person and the presence of my family and children relieves this pressure." (P. 2)

4.7.3.2 Culture and Friends' Support

The role of culture in facilitating self-care was evident. Analysis of the interviews indicated that participants benefited from a collectivist culture in Saudi Arabia, where there was significant family and social support around patients. Walking with friends in a group facilitated physical activity among participants. Participants described this as a joyful habit, while they perceived individual exercises as boring.

"I think that walking is something that should be done in groups and not an individual one." (P. 4)

There are people, oh God, may God protect us and you and them, I mean, sometimes they are keen on me for example, when one of our friends invited me, they say, Abu Abdullah, take your treatment with you, at least the diuretics. This is because they usually serve tea, coffee, juice and water, lots of fluid and they may be harmful for me. (P. 9).

Nevertheless, when some were asked directly about the role of culture in self-care, they couldn't relate self-care to culture. Rather, they viewed self-care as a personal matter that required an individual's motivation and determination to actively become engaged in looking after themselves through seeking information and following up health advice.

4.7.3.3 Social Media

The presence of social media facilitated self-care; participants were following influential people in society and were seeking health information to improve their lifestyle. Participants navigated social media for information about their disease and health advice. Some participants mentioned discussing the health recommendations they encountered on social media with their healthcare providers to ensure their effectiveness and accuracy.

A while ago, [I watched] a video spread in which someone talked about the harm of canned foods, especially for heart patients, because they contain preservatives with a

high content of salt and industrial materials. I asked the doctor and he said, It is true that it is harmful, so I stopped using it and noticed the difference—I am lighter and more energetic, so I stopped it permanently. (P. 9)

4.7.3.4 Accessibility and Affordability of Healthcare Services

A number of participants mentioned that the healthcare service facilitated their self-care by providing free services and easy access during emergencies. Participants residing in remote areas from the Cardiac Centre highlighted that during their visits, they were supplied with enough medications to last up to three months until their next appointment.

4.7.3.5 The Availability of Recreational Facilities

The availability of recreational facilities encouraged participants' self-care practices by promoting physical activities. Living near parks or walking paths motivated them to stay active, often enjoying walks with friends. Additionally, some participants were physically active due to the demands of their jobs, such as working on their farms or caring for livestock.

"Most of my time can be on tours, I walk long distances during the tour. This can compensate for the issue of walking for me." (P. 4)

4.8 Category 6: Self-Care Barriers

Several personal, disease-related, and environmental factors were identified as hindering self-care practices. Personal factors included religious beliefs, knowledge gaps, and lack of time. Disease-related factors encompassed cognitive barriers, depression, the side effects of medications and comorbid health issues. Environmental factors involved lack of support from the family, cultural barriers, social media, poor access to healthcare services, distrust in healthcare providers, and adverse weather conditions.

4.8.1 Personal Factors

4.8.1.1 Religious Beliefs

Belief in fatalism and reliance on God were prominent characteristics among participants. While these beliefs provided reassurance and comfort, they also acted as a barrier to effective self-care. Some participants expressed a tendency to neglect their treatment, reasoning that their commitment to self-care would not alter their situation, as everything was perceived to be within God's will.

"I mean some people when we advise them to attend their doctor's appointments or take their medication regularly. They said no, guys, everything is destined and written, and this does not delay the day of death." (P. 4).

4.8.1.2 Knowledge Gaps

Many participants voiced concerns about the lack of sufficient information available on self-care and healthy alternatives, with some demonstrating knowledge gaps by making inaccurate statements. Some participants viewed heart failure as a temporary problem that could be resolved rather than recognising it as a chronic cardiovascular condition requiring ongoing management.

"In conclusion, I knew that my condition was accidental, and it ended." (P. 4)

Additionally, there was a widespread misunderstanding regarding the practice of daily weight measurement, with many believing it was only for weight loss or to maintain an ideal weight rather than for monitoring body fluids. Some participants also expressed concerns about gaining weight, focusing on eating less as a solution rather than addressing their fluid balance.

"I tried to eat as little as possible." (P. 14).

Some participants suggested that their weight gain might be related to heart failure medications. One individual expressed uncertainty, stating,

"I noticed weight, I do not know the reason? Is it because of the pills or not?" (P. 12)

4.8.1.3 Lack of Time

Some participants complained of lack of time and how their work limited their ability to engage in healthy practices.

"I tried, but sometimes I walk a little. You know the nature of our work has stress and no time for other things." (P. 14)

4.8.2 Disease-Related Factors

4.8.2.1 Cognitive Barriers

Some participants attributed their lack of self-care to forgetfulness and poor memory, often laughing it off as an excuse. They cited distractions from parenting, demanding work schedules,

and household chores as common obstacles to self-care. When one participant was asked about her typical day of self-care, she responded:

“Nothing specific. Busy as usual as any mother; I mean I forget my medication sometimes.” (P. 2)

4.8.2.2 Depression

During interviews, a few participants openly shared their struggles with depression, a waning enthusiasm for life, and an acceptance of death. One participant recounted a profound personal experience in which his heart stopped beating for ten minutes. In the aftermath, he described wrestling with the concept of turmoil after death, shaped by influences from various media portrayals. Surprisingly, this firsthand experience prompted the participant to reach an unconventional conclusion—contrary to the common perception of death as a frightening place, he found it to be a more enriching aspect than his current life.

“My needs have changed a lot, and my outlook on life has changed in a second way ... I mean, my life has become boring.” (P. 3)

Additionally, this participant expressed a belief that doctors tend to exaggerate the topic, suggesting a nuanced perspective on medical discussions and perhaps a desire for a more balanced approach to health-related conversations.

“I mean, I feel like doctors always exaggerate the topic a bit.” (P. 3)

4.8.2.3 Side Effects of Medications

A number of participants expressed concerns about the side effects of their medications, which created barriers to adherence. Participants experienced stomach pain, high blood potassium levels and low blood pressure, which needed to be treated and monitored periodically to avoid complications and improve their daily life. In addition, they expressed frustration with diuretics which had to be taken at specific times—either before leaving the house or before bed bedtime—to avoid inconvenience.

“Like a diuretic. If I take this pill, I have to stay home for three hours. I don't go out because I need to go to the toilet and so on.” (P. 3)

4.8.2.4 Comorbid Health Issues

Participants highlighted health issues not directly linked to heart failure, which posed challenges to their self-care, such as foot injuries or strokes. An individual explained,

"Engaging in sports is not an option for me, as I had a stroke before." (P. 6)

Similarly, another participant pointed out a restriction, stating,

"I am unable to walk due to an injury to my feet." (P. 11)

4.8.3 Environmental Factors

4.8.3.1 Lack of Support from the Family

While some participants viewed their family as facilitators of self-care, an analysis of their quotes revealed that family members could also act as barriers. For instance, participants reported a lack of cooperation from their spouses or family in heart failure management practices, which placed an additional burden on them.

I mean, I don't have anyone helping me around the house. Mmmm, especially my husband, he doesn't like to eat the food I make for me, so it's hard for me to make two different foods, one for me and one for my husband and kids, so if I cook for them, I'll eat it with them. (P. 12)

"I may not have been able to convince my wife that she should make a healthy food for all." (P. 4)

It was noted that certain actions, perceived by participants as crucial and beneficial, were actually detrimental. For example, the statement:

"She [wife] goes to buy it [antihypertensive medication] from the pharmacy if she sees me angry." (P. 6)

"I only smoke cigarettes, and I have a dislike for both shisha and electronic cigarettes. Despite having two new electronic cigarettes at home, my brothers gave them to me in an attempt to aid me in quitting smoking." (P. 9)

4.8.3.2 Cultural Barriers

Through the participants' conversations, the cultural importance of being a member of a group and sharing participation in all aspects of life together became clear—whether with family,

friends, or the broader community. The reluctance to engage in activities independently could lead participants to either abandon healthy practices altogether or struggle to maintain them without group support. The influence of group dynamics also made it challenging for individuals to adopt different habits, such as a low-salt diet, even when necessary for heart failure self-care. Some participants expressed a desire to eat differently but noted that their families were unwilling to change their eating habits, making it very difficult to pursue healthier choices.

You see, we Saudis are accustomed to a wrong diet. I mean, we rely heavily on carbohydrates. If what we eat, we do not know what we should eat instead. I mean, one day I asked my husband, you want lunch or dinner, he says, either bread or rice. Even if you cook other food like grills and salads, we can't eat them without rice or bread. (P. 12)

As is common in many Middle Eastern societies, the responsibility for cooking and preparing food falls on women. Consequently, most male participants noted that a lack of understanding or cooperation from their wives or food preparers was a significant obstacle to self-care.

In addition, participants acknowledged that developing self-care habits can be difficult, especially for older adults, and linked this to their culture and customs. They emphasised the influence of cultural practices and customs on self-care, particularly the challenges adults face in adopting new behaviours. One participant expressed:

The topic from the beginning is the topic of culture and customs. As if you were used to a toothbrush. I am fifty years old, and now I have an occasional toothbrush. It is true that we are not used to taking care of ourselves. But if you teach a young child, they will have a biological clock programmed. But the adult—it is hard to change his habits. (P. 4)

In this example, the participant compared the ingrained nature of these habits to the use of a toothbrush (actions done every day for so many years that they were done almost automatically), suggesting that while young children can develop routines more easily, adults struggle to change ingrained habits. The metaphor of a toothbrush symbolises routinised everyday self-care practices, while the “biological clock” represents the ability to internalise these routines from an early age.

4.8.3.3 Social Media

Technology played a pivotal role in supporting most participants in their self-care practices, particularly in accessing health-related information. However, while many acknowledged its advantages, some raised concerns about the use of social media. They highlighted several issues: first, not everyone, especially older people, may be proficient in using these platforms; second, there is potential for misuse and subsequent errors; and third, the risk of time wastage and disturbances to sleep patterns that may arise from its usage.

For example, anything I ask my children about, they are searching on the internet for everything about medicines, lab tests, diseases, places, even the weather today. The technology is useful, but I do not know how to use it (mobile phone). Oh God, use the mobile for calling. (P. 5)

4.8.3.4 Poor Access to Healthcare Services

Participants residing in remote areas expressed difficulties in accessing the Cardiac Centre, often needing to leave very early to arrive on time for appointments. One individual highlighted the considerable distance between their home and the healthcare centre, citing it as a potential obstacle to maintaining regular follow-ups and seeking timely assistance to prevent escalating issues. Another participant expressed fear of venturing into locations far from healthcare facilities, such as remote wilderness areas with friends, due to concerns about the extended travel time to reach a centre in the event of a health emergency.

"I mean, in order to attend the doctor's appointment, I need to drive the car for two hours. It makes me tired." (P. 5)

4.8.3.5 Distrust in Healthcare Providers

While many participants stressed the significance of following doctors' advice to improve their health, one individual raised concern regarding the portrayal of their condition. This participant questioned whether their condition was being exaggerated or overstated. They expressed a belief in the need for moderation in self-care practices, suggesting that doctors often magnify the seriousness of conditions, warnings, and recommendations, which has led to some distrust in their advice.

I follow the treatment regimen, but I feel like doctors always exaggerate the topic a bit. If you do everything according to their mood, you will get tired, and you will not be able to satisfy them and yourself. Moderation is better. (P. 3)

4.8.3.6 Adverse Weather Conditions

Weather conditions posed a hindrance for some patients, as both extreme hot and cold temperatures were perceived as deterrents to outdoor exercise, discouraging them from engaging in physical activity throughout the year. One participant explained why they were unable to walk daily:

I don't manage to do it daily the weather can be a problem. If it's too hot or cold, it's difficult. (P. 9)

4.9 Summary

This phase of the study aimed to identify how individuals with heart failure in Saudi Arabia perceive and practise self-care regarding their condition, addressing Research Question 1. The analysis identified six main categories:

1. **The Impact of heart failure on everyday life:** This category encompassed physical, psychological, social, spiritual, and occupational aspects.
2. **Knowledge of heart failure:** This included participants' understanding of their condition.
3. **Self-care practices:** This category covered activities such as seeking information about their disease, adopting a healthier diet, exercising, maintaining a balance between work and rest, quitting smoking, establishing a good sleep routine, adhering to medication regimens, following healthcare providers' advice, not missing appointments and avoiding stress.
4. **Self-care deficits:** This revealed challenges such as medication non-compliance, irregular weight monitoring, dietary lapses, and ongoing smoking.
5. **Self-care facilitators:** These were categorised as personal, disease-related, and environmental factors that support self-care.
6. **Self-care barriers:** This category included personal, disease-related and environmental obstacles hindering optimal self-care.

This extensive exploration provides insights into the nuanced aspects of self-care among individuals with heart failure in Saudi Arabia. The interviews with participants uncovered various cultural beliefs that significantly influence self-care adherence. These beliefs are deeply rooted in social, religious, and traditional practices, shaping how patients manage their condition. Understanding these cultural nuances is essential for developing effective interventions to improve self-care behaviours. Most of the Saudi population places a high value on social gatherings for activities such as eating, exercising, and engaging in conversation, rather than spending time alone. While these communal events foster social cohesion, they can sometimes disrupt established self-care routines. Traditional dietary habits, including the consumption of customary foods, drinks, and salt, play a significant role in daily life. The roles of women, men, and children are distinctly defined within Saudi society in areas such as food preparation, family care, and responsibility distribution. These roles influence various aspects of daily life and healthy behaviours, which, in turn, interact with self-care practices.

While most participants acknowledged the importance of following healthcare professionals' advice and recognised its value, some considered it exaggerated. Participants were more likely to rely on the presence of unpleasant symptoms to engage in self-care practices reactively rather than practising proactive self-care monitoring to detect early signs of deterioration. Psychological health was also regarded as crucial by most participants, with an emphasis on providing reassurance, facilitating adaptation, and fostering acceptance of heart failure.

Moreover, the interviews highlighted additional factors important for understanding the self-care dynamics of individuals with heart failure in Saudi Arabia that were not reported in the literature review. Consequently, these factors were integrated into the Phase Two questionnaire. Notably, motivation emerged as a crucial factor, along with the availability of time for self-care activities and the impact of the internet and social media on self-care behaviours. Participants also noted that the presence of other health issues or concurrent challenges could impede their engagement in heart health self-care activities. Clear guidance from healthcare professionals, particularly doctors and nurses, on the specifics of self-care practices was emphasised as pivotal, as was the importance of feeling comfortable asking questions and discussing concerns with healthcare providers. These factors contribute to a broader understanding of the complex landscape of self-care in the context of heart failure in Saudi Arabia.

Chapter Five: Phase Two Results

5.1 Introduction

This chapter presents the findings from Phase Two of the study, focusing on the quantitative results. Specifically, it addresses Research Question 2, which examined the level of self-care adherence in patients living with heart failure in Saudi Arabia, and Research Question 3, which investigated the factors influencing self-care adherence in these patients. Additionally, sub-questions related to personal, problem or disease-related, environmental, or other factors determining, predicting, facilitating, or presenting barriers to self-care adherence in heart failure patients were explored.

5.2 Personal Characteristics of the Study Sample

Personal characteristics of the sample are presented in Table 9. The mean (SD) age of participants was 59.9 (13.6) years, and the majority were male (67.3%). The mean age (SD) for males was 60.20 (14.18) years, and for females, 59.19 (12.47) years. Most participants were married (72.7%, n=149) and lived with a spouse and children (68.8%, n=141). Almost half were retired (42.9%, n=88); only 18.5% (n=38) were engaged in full-time employment, and 13.2% (n=27) of respondents reported working from home. The majority perceived their income as adequate for their needs (61.0%, n=125). Concerning education, 28.8% (n=59) had no education, 12.2% (n=25) had primary education only, whereas 43.9% (n=90) were educated to secondary, high school or diploma level. All participants identified as Muslim. Among the surveyed participants, 24.4% (n=50) reported being current smokers, while 75.6% (n=155) stated that they did not smoke.

The Dutch heart failure knowledge scale (DHFKS) was tested to check the internal consistency of this tool with this sample, demonstrating a Cronbach alpha value of 0.347. Participants reported a median (IQR) DHFKS score of 9.0 (4.0), ranging from 4.0–14.0, indicating a relatively good knowledge level.

Table 9: Personal Characteristics of Participants (n=205)

Age y	Mean (SD), Min – Max	59.9 (13.6), 34.0 - 94.0
Gender	Male, n (%) Female, n (%)	138 (67.3) 67 (32.7)
Marital status	Single, divorced or widowed n (%) Married, n (%)	56 (27.3) 149 (72.7)
Living circumstances	Lived alone, n (%) Lived with spouse and children, n (%) Lived with spouse and no children, n (%) Lived with children and no spouse, n (%) Lived with parent, n (%) Lived with other, n (%)	7 (3.4) 141 (68.8) 6 (2.9) 43 (21.0) 8 (3.9) 0 (0)
Employment	Employed full-time, n (%) Employed part-time, n (%) Unemployed but looking for work, n (%) Unemployed and not looking for work, n (%) Retired, n (%) Work at home, n (%)	38 (18.5) 8 (3.9) 4 (2.0) 40 (19.5) 88 (42.9) 27 (13.2)
Perceived adequacy of income	Less than needs, n (%) Suitable for needs, n (%) More than needs, n (%)	69 (33.7) 125 (61.0) 11 (5.4)
Highest level of education	No education, n (%) Primary, n (%) Secondary, n (%) High school, n (%) Diploma, n (%) University, n (%)	59 (28.8) 25 (12.2) 34 (16.6) 40 (19.5) 16 (7.8) 31 (15.1)
Religion	Muslim, n (%)	205(100.0)
Current smoker	Yes, n (%) No, n (%)	50 (24.4) 155 (75.6)
DHFKS	Median (IQR), Min–Max	9.0 (4.0), 4.0 -14.0

SD: Standard deviation, Min: Minimum, Max: Maximum, n: number, DHFKS: Dutch heart failure knowledge scale

5.3 Disease-Related Characteristics

The disease-related characteristics of the sample are presented in Table 10. The participants demonstrated diverse cognitive function. Mini-Cog scores ranged from 1 to 5 with a median

score of 5.0. In total, 14.1% of participants scored 2 or below, suggesting cognitive impairment. Participants had been diagnosed with HF for a median (IQR) of 5.0 (6.0) years, with the majority classified at NYHA class I and II, representing no or only mild symptoms (45.9% and 42.0%, respectively). Almost all participants had experienced at least one hospitalisation due to HF in the past year (95.2%), with a median (IQR) of 2.0 (2.0) hospital admissions in the previous year. Comorbidity scores were measured by the Charlson comorbidity index (CCI) (Charlson et al., 1994). The CCI findings revealed that all participants had at least one comorbid health condition. Specifically, 13.2% were diagnosed with one or two co-morbid diseases, 28.8% had three or four other conditions, and 58.0% reported five and more co-morbidities.

The internal consistency of the HADS depression and anxiety sections were tested within this sample, demonstrating Cronbach alpha values of 0.705 and 0.773 respectively. The median (IQR) HADS depression score was 8.0 (6.0), with a range of 0 to 19.0. Notably, 102 participants (49.8%) were categorised as having normal levels of depression symptoms (0-7), while 103 participants (50.2%) fell into the depression category (≥ 8). In terms of anxiety, the median (IQR) score was 7.0 (5.0), ranging from 0 to 17.0. A significant majority of participants, 155 (75.6%), exhibited normal levels of anxiety symptoms (0-9), while 50 participants (24.4%) were classified as experiencing anxious symptoms (≥ 10).

Participants took a median (IQR) of 7.0 (3.0) regular medications per day. The medication adherence report scale (MARS-5; (Horne & Weinman, 2002) was initially tested to establish the internal consistency of this tool within this sample. This analysis yielded a Cronbach alpha value of 0.747, indicating acceptable internal consistency. Regarding MARS-5 scores, 37.1% scored ≥ 20 , indicating good adherence, while 62.9% scored < 20 , indicating non-adherence.

Table 10: Disease-Related Characteristics of Participants (n=205)

Mini-Cog scores	Median (IQR), Min–Max Mini Cog (≤ 2), n (%) Mini Cog (3-5), n (%)	5.0 (2.0), 1.0 - 5.0 29 (14.1) 176 (85.9)
HF duration years	Median (IQR), Min–Max	5.0 (6.0), 0.5 -16.0
NYHA class	NYHA class I, n (%) NYHA class II class, n (%) NYHA classes III & IV, n (%)	94 (45.9) 86 (42.0) 25 (12.2)
Hospital admissions in the previous year	Median (IQR), Min–Max	2.0 (2.0), 0 - 10.0
CCI scores	Mild: (1-2), n (%) Moderate: (3-4), n (%) Severe: ≥ 5 , n (%)	27 (13.2) 59 (28.8) 119 (58.0)
HADS depression scores	Median (IQR), Min–Max Normal (0-7), n (%) Depressive (≥ 8), n (%)	8.0 (6.0), 0 – 19.0 102(49.8) 103 (50.2)
HADS-anxiety scores	Median (IQR), Min–Max Normal (0-9), n (%) Anxious (≥ 10), n (%)	7.0 (5.0), 0- 17.0 155 (75.6) 50 (24.4)
Number of regular medications per day	Median (IQR), Min–Max	7.0 (3.0), 1.0 - 13.0
MARS-5 scores	Median (IQR), Min–Max MARS-5 (≥ 20), n (%) MARS-5 (< 20), n (%)	22.0 (4.0), 11.0 – 25.0 76 (37.1) 129 (62.9)

NYHA: New York Heart Association, n: number, HF: Heart failure, IQR: Interquartile range, Min: Minimum, Max: Maximum, MARS-5: The five-item medication adherence report scale, Mini-Cog: rapid cognitive impairment screening, HADS: hospital anxiety and depression scale

5.4 Environmental Characteristics

The environmental characteristics of the sample are presented in Table 11. The internal consistency of the total score of MSPSS tool within this sample was first tested, demonstrating a Cronbach alpha value of 0.843, indicating good internal consistency. For the MSPSS 'Significant

other' subscale, the Cronbach alpha value was 0.791; the MSPSS 'Family' subscale, was 0.807 and the MSPSS 'Friend' subscale was 0.682.

Participants reported a median (IQR) total MSPSS score of 5.8 (1.1), with a range spanning from 2.7 to 7.0. Participants reported a median (IQR) score of 6.0 (1.2) for the MSPSS 'Significant other' subscale, indicating a moderate to high level of perceived support from their significant other. The 'Family' subscale demonstrated a slightly higher median (IQR) score of 6.2 (1.0), suggesting a relatively stronger perception of support within the familial context. In contrast, the 'Friend' subscale exhibited a lower median (IQR) score of 5.2 (1.5), signifying a comparatively lower perception of support from friends. The observed ranges (2.2 to 7.0 for 'Significant other' and 'Family', from 2.0 to 7.0 for 'Friends') illustrate the diversity in reported levels of perceived social support within each relationship category. A majority of participants (80.0%) reported high levels of total perceived social support, falling within the range of 5.1 to 7.0. A further 19.0% fell into the moderate range (3 to 5), whilst a small proportion (1.0%) scored in the low range (1 to 2.9). These findings highlight the prevalence of high social support among the majority of participants.

Regarding caregiving support, 35.5% of participants reported having a family caregiver, while 64.5% indicated that they did not. Considering the generally high level of perceived social support from family—reflected by 80% of participants having MSPSS scores in the 'high support' range (Zimet et al., 1988) (Table 11)—this may suggest that many individuals either did not require a dedicated family caregiver to manage their heart failure or did not perceive the need for one, regardless of the actual support provided by family members. In terms of paid caregiving, only a small proportion (2.9%) reported having access to paid carers, while the vast majority (97.1%) did not report using paid caregiving services.

Table 11: Environmental Characteristics of Participants (n=205)

MSPSS total score	Median (IQR), Min – Max Low (1 - 2.9), n (%) Moderate (3 – 5), n (%) High (5.1 – 7), n (%) MSPSS ‘Significant other’ subscale MSPSS ‘Family’ subscale MSPSS ‘Friend’ subscale	5.8 (1.1), 2.7 – 7.0 2 (1.0) 39 (19.0) 164 (80.0) 6.0 (1.2), 2.2 – 7.0 6.2(1.0), 2.2 – 7.0 5.2(1.5), 2.0-7.0
Have family caregivers	Yes, n (%) No, n (%)	72(35.5) 133 (64.5)
Have paid carer	Yes, n (%) No, n (%)	6 (2.9) 199 (97.1)

MSPSS: Multidimensional scale of perceived social support, IQR: Interquartile range, Min: Minimum, Max: Maximum, n: Number

5.5 Other Characteristics

Table 12 presents additional participant characteristics identified as important for HF self-care during the Phase One interviews. These characteristics were subsequently examined in Phase Two to provide deeper insights into their impact on self-care practices. According to the survey results, walking outdoors emerged as the most common physical activity, with 32.2% walking alone and 31.2% walking with others. However, 34.1% reported not engaging in any form of exercise. The primary motivation for self-care was improving health (52.2%), followed by the desire to stay with family as long as possible (25.9%). Opinions on the use of the internet and social media for self-care were divided: 23.9% viewed them as a waste of time, while 22.0% found them helpful for cardiac self-care. Additionally, 12.7% reported other health problems that hindered their self-care efforts. A majority of participants (89.3%) indicated that they received clear advice on self-care from healthcare providers, and 62.0% felt comfortable discussing their concerns with them. The availability of time for self-care practices varied, with 23.4% reporting

sufficient time for necessary practices, while 22.9% found it challenging to consistently allocate time for routine self-care.

5.6 Adherence to Self-Care Practice

Data were collected using the self-care of heart failure index (SCHFI) (Riegel et al., 2009) in order to address Research Question 2: What is the level of self-care practice adherence in patients living with heart failure in Saudi Arabia? First, the internal consistency of this tool with this sample was tested, demonstrating Cronbach alpha values of 0.551, 0.511 and 0.789 for the self-care maintenance, self-care management and self-care confidence sub-scales, respectively.

The analysis of self-care subscales among these participants revealed suboptimal scores across the board. The median (IQR) self-care maintenance score was 43.3 (23.3); the self-care management subscale score was 45.0 (20.0); the self-care confidence score was 55.6 (27.8). The observed minimum and maximum values across these dimensions were 9.99 to 76.6 for maintenance, 0 to 90.0 for management, and 5.6 to 100 for confidence. With the established cut-off for adequate self-care scores at ≥ 70 on each subscale of the SCHFI (Riegel et al., 2022; Riegel et al., 2009), overall, HF self-care was inadequate, with all median sub-scale scores falling below the cut-off value (Table 13). Furthermore, participants were classified with inadequate self-care maintenance with (96.6%), self-care management (91.7%) and self-care confidence (77.1%). The descriptive statistics for the participants' responses for the individual items of the SCHFI self-care maintenance, management and confidence subscales are presented in Appendices 25, 26 & 27.

Table 12: Other Characteristics of Participants (n=205)

The most common type of physical activity participants engaged in	Walking outdoors with friends or family, n (%)	64 (31.2)
	Walking outdoors alone, n (%)	66 (32.2)
	Using a treadmill or other exercise equipment at home or in a gym, n (%)	5 (2.4)
	No exercise, n (%)	70 (34.1)
Chief motivation for self-care	To improve health, n (%)	107 (52.2)
	Live a longer life, n (%)	32 (15.6)
	Improve quality of life, n (%)	13 (6.3)
	Remain with family for as long as possible, n (%)	53 (25.9)
Opinions about using internet and social media in HF cardiac self-care	A waste of time and useless, n (%)	49 (23.9)
	Potentially useful, but unable to use it, n (%)	42 (20.5)
	Friends or family find it useful, but unable to use it themselves, n (%)	17 (8.3)
	Use it but don't find it helpful for self-care, n (%)	52 (25.4)
	Use it and find it helpful for self-care, n (%)	45 (22.0)
Having other health problems that prevent HF self-care	Yes, n (%)	26 (12.7)
	No, n (%)	179 (87.3)
Received clear advice on self-care	Yes, n (%)	183 (89.3)
	No, n (%)	22 (10.7)
Comfortable in discussing concerns with doctors or nurses	I am comfortable asking questions and discussing my concerns with my doctor or nurse, n (%)	127 (62.0)
	I am comfortable asking some but not all questions and discussing some concerns with my doctor or nurse, n (%)	48 (23.4)
	I am uncomfortable asking questions and discussing my concerns with my doctor or nurse, n (%)	16 (7.8)
	I usually don't ask questions or discuss my concerns with my doctor or nurse, n (%)	14 (6.8)
Availability of time	I don't have time to do self-care practices for my heart health, n (%)	5 (2.4)
	I don't have enough time to do all the self-care practices for my heart health that I would like, n (%)	13 (6.3)
	I try to make time for self-care to become routine, but I don't always achieve this, n (%)	47 (22.9)
	I try to make time, but I do not have enough time because of other more important commitments, n (%)	30(14.6)
	I have time to do some self-care practices for my heart health, n (%)	62 (30.2)

	I have enough time to do the self-care practices I need for my heart health, n (%)	48 (23.4)
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Table 13: SCHFI Subscales Scores

Self-care maintenance	Median (IQR), Min–Max Inadequate self-care maintenance (scores 1-69), n (%) Adequate self-care maintenance (scores ≥70), n (%)	43.3 (23.3), 9.99 - 76.6 198 (96.6) 7 (3.4)
Self-care management	Median (IQR), Min–Max Inadequate self-care management (scores 1-69), n (%) Adequate self-care management (scores ≥70), n (%)	45.0 (20.0), 0 - 90.0 187 (91.2) 18 (8.8)
Self-care confidence	Median (IQR), Min–Max Inadequate self-care confidence (scores 1-69), n (%) Adequate self-care confidence (scores ≥70), n (%)	55.6 (27.8), 5.6 – 100 158 (77.1) 47(22.9)

5.7 Factors Related to Self-Care Adherence

The results presented in this section addresses the Research Question 3, focusing on personal, problem- or disease-related, environmental and other factors that potentially facilitate or present barriers to self-care adherence in heart failure patients. As explained in Section 3.8.2, variables reflecting personal, problem or disease, environmental or ‘other’ (from Phase One data) factors associated with self-care adherence in patients living with heart failure were identified. These variables comprised:

Personal characteristics of age, gender, marital status, living circumstances, highest level of education, perceived adequacy of income, employment, current smoking status, religion and HF knowledge (DHFKS).

Disease or problem-related characteristics as HF severity (NYHA class), co-morbidities (CCI score), cognitive function (Mini-Cog), HF duration, number of hospital admissions in the last year,

number of medications per day, medication adherence (MARS-5) and mental wellbeing (HADS depression and HADS anxiety).

Environmental characteristics of social support (MSPSS), having family caregivers and having a paid caregiver.

Other factors identified from the Phase One qualitative findings comprised: the most common type of physical activity they engage in; chief motivation for self-care; patients' opinion on internet and social media; having other health issues or other problems that hinder engagement in self-care practices for heart health; receiving clear advice from a doctor or nurse; reportedly being comfortable asking questions and discussing concerns with a doctor or nurse; and availability of time to do self-care activities.

To identify factors statistically significantly related to HF self-care adherence in the study sample, three multiple regression analyses were conducted for the self-care maintenance, self-care management and self-care confidence subscales of the SCHFI. Each of the three subscale scores of the SCHFI (Riegel et al. 2009 (Riegel et al., 2022) comprised the dependent variables. Independent variables were chosen as described in Section 3.8.2 and set out above at Section 5.7. Bivariate analyses were also performed to identify factors associated with the subscale scores of the SCHFI at a significance level of $p < 0.05$ (Table 14).

Table 14: Preliminary Bivariate Analyses of Associations Between SCHFI Subscale Scores and Potential Independent Variables (n=205)

	Self-care maintenance P value	Self-care management P value	Self-care confidence P value
Personal characteristics			
Age ^a	.346	.052*	.279
Gender ^c	.233*	.066*	.300
Marital status ^{c†}	.005*	.215*	.687
Living circumstances ^{c†}	.257	.070*	.755
Highest level of education ^{c†}	.052*	.845	.560
Perceived adequacy of income ^b	.572	.353	.071*
Employment status ^{c†}	.170*	.199*	.104*
Current smoking ^c	.241*	.955	.946
DHFKS ^b	.015*	.381	.025*
Disease-related characteristics			
NYHA class ^b	.576	.642	.068*
CCI ^b	.920	.018*	.830
Mini-Cog ^c	.157*	.318	.197*
HF duration ^b	.302	.000*	.561
Number of hospital admissions ^b	.131*	.291	.002*
Number of medications per day ^b	.559	.696	.016*
MARS-5 ^c	.068*	.455	.007*
HADS depression ^b	.005*	.737	<.001*
HADS anxiety ^b	.035*	.299	.001*
Environmental characteristics			
MSPSS total score ^b	.038*	.855	.005*
Having family caregivers ^c	.010*	.152*	.409
Having paid caregivers ^c	.115*	.291	.629
Other characteristics			
The most common types of physical activity engaged in ^{c†}	.000*	.115*	.169*
Chief motivation for self-care ^d	.477	.430	.355
Participants' opinion of internet and social media for cardiac self- care ^{d†}	.114*	.614	.842

Having other health problems that prevent cardiac self-care ^c	.098*	.912	.091*
Clear advice on how to do self-care ^c	.075*	.043*	.150*
Comfortable with talking with doctors or nurses ^{c†}	.001*	.017*	.003*
Availability of time ^{c†}	.474	.131*	.951

^a Pearson Correlation; ^b Spearman Correlation Coefficient; ^c Mann-Whitney test; ^d Kruskal Wallis Test;

[†] Collapsed to single/married; live alone/with others; educated/non- education; employed/non employed; do physical activities/no; use it/not useful/ useful; uncomfortable/uncomfortable; having time/not having time. * P < 0.25

5.7.1 Multiple Regression Modelling

Nineteen potential predictor variables were eligible for inclusion in the self-care maintenance model. These were:

- *Personal characteristics* of gender, marital status, education, employment, current smoking and DHFKS.
- *Disease or problem-related characteristics* of Mini Cog, number of hospital admissions, MARS-5, HADS depression and HADS anxiety.
- *Environmental characteristics* entailed MSPSS, having family caregivers and having a paid caregiver.
- *Other characteristics* of the most common type of physical activity they engage in, participants' opinion on internet and social media, having other health issues that hinder engagement in cardiac self-care, receiving clear advice from their doctor or nurse, and reported comfort in asking questions and discussing concerns with a doctor or nurse.

Eleven potential predictor variables were eligible for inclusion in the self-care management model. These were:

- *Personal characteristics* of age, gender, living circumstances and employment.
- *Disease related characteristics* of CCI score and HF duration.
- *Environmental characteristics* of having family caregivers

- *Other characteristics* of the most common type of physical activity they engage in, clear advice on how to do self-care from doctor or nurse, feel comfortable asking questions, discussing concerns with doctor or nurse, and availability of time.

Fifteen potential predictor variables were eligible for inclusion in the self-care confidence model. These were:

- *Personal characteristics* of perceived adequacy of income, employment and DHFKS.
- *Disease-related characteristics* of NYHA class, Mini Cog, number of hospital admissions, number of medications per day, MARS-5, HADS depression and HADS anxiety.
- *Environmental characteristics* of MSPSS.
- *Other characteristics* of the most common type of physical activity they engage in, other health issues, clear advice from doctor or nurse and feel comfortable asking questions and discussing concerns with doctor or nurse.

All variables were then tested to ensure that the assumptions for regression modelling were met. The multiple linear regression analysis adhered to critical assumptions, ensuring the absence of significant multicollinearity, compliance with multivariate normality through normally distributed residuals, confirmation of a modest linear correlation between dependent and independent variables, and assurance of homoscedasticity, indicating consistent residual variance across levels of independent variables.

The examination for homoscedasticity involved a thorough review of scatterplots to ensure that data points fell within the -3 to 3 range on both the x and y axes. However, during the meticulous examination of multiple regression model assumptions, a noteworthy issue of multicollinearity emerged. Examining the correlation coefficients between all independent variables (See Appendix 28: Correlations Between Independent Variables), a high correlation was noted between the independent variables of "marital status" and "living circumstances" ($r = -0.750$). Consequently, to address this concern regarding multicollinearity, a decision was made to exclude the "marital status" variable from the multiple regression model for self-care management. This variable was chosen for exclusion, as living circumstances, either with other or alone, can play a more significant role in shaping HF self-management behaviours than marital status (Artinian et al., 2002). Living with others, especially family members, provides essential support networks, assistance with daily tasks, emotional support, and symptom monitoring, all

of which contribute to a positive influence on patient adherence to treatment recommendations and self-care behaviours (DiMatteo, 2004; Irani et al., 2019).

In addition, there were a number of categorical variables with multiple response options that did not possess an inherently ordered structure suitable for direct entry into a regression model. Consequently, these categorical variables were converted into a set of bivariate responses, typically represented as "yes" or "no" through the creation of dummy variables. These variables included living circumstances, perceived adequacy of income, employment status, the most common types of physical activity engaged in, participants' opinion of internet and social media and its roles in self-care for heart health, and being comfortable asking questions of doctors or nurses.

At the conclusion of this testing of assumptions, a total of 19 independent variables was eligible for entry into the model to test factors predictive of self-care maintenance; a total of 11 independent variables was eligible for entry into the model to test factors predictive of self-care management; and a total of 15 independent variables was eligible for entry into the model to test factors predictive of self-care confidence. The results from the multiple regression analyses performed on each of the three SCHFI subscales are summarised in Tables 17, 18 and 19.

When self-care maintenance was regressed on the potential independent variables, the self-care maintenance model demonstrated statistical significance of $F = 2.685$, $P < .001$. The value of $R^2 = .216$ indicated that the model explained 21% of variance in self-care maintenance. The variable that was statistically significantly associated with self-care maintenance was physical activity status, with a $\beta = 10.130$, $p < 0.001$. Engaging in physical activity, compared to no exercise, was associated with a substantial increase in self-care maintenance, with a β coefficient of 10.130 ($p < 0.001$). No other variable (personal, disease-related, environmental or other) showed significant relationships with self-care maintenance (See Table 15).

The model equation for self-care maintenance was: self-care maintenance = $18.411 + (10.130 \times \text{doing physical activities})$. According to this model, for every one-unit increase in the variable "engaging in physical activities," the self-care maintenance score is expected to increase by 10.130 units.

When self-care management was regressed on the potential independent variables, the self-care management model demonstrated statistical significance of $F = 3.005$, $P < 0.001$. The

value of $R^2=0.146$ indicated that the model explained 14% of variance in self-care management. In examining the associates of self-care management for heart health, disease-related characteristics emerged as a significant influence, with heart failure duration ($\beta =0.807$, $p = 0.020$) showing a significant positive association. In addition, being comfortable discussing with healthcare professionals was influential, revealing substantial positive associations for those comfortable with seeking advice from doctors or nurses ($\beta = 9.144$, $p < 0.010$) when compared to individuals who typically did not engage in discussions with healthcare providers or did not feel comfortable doing this. No other examined personal, environmental, or additional disease-related characteristics demonstrated a significant association with self-care management in this analysis (See Table 16).

The model equation for self-care management was self-care management = $40.038 + (.807 \times \text{HF duration}) + (9.144 \times \text{feeling comfortable asking questions and discussing concerns with doctor or nurse})$. The model indicates that for every one-unit increase in "HF duration" (i.e. for every additional year) the self-care management score is expected to increase by 0.807 units. Similarly, for every one-unit increase in "feeling comfortable asking questions and concerns with doctors or nurse," the associated with self-care management score is expected to increase by 9.144 units.

Table 15: Multiple Regression Analysis on Self-Care Maintenance (n=205)

	Unstandardised β	P	95.0% Confidence Interval		
			Lower Bound	Upper Bound	
Personal characteristics					F (19, 185) = 2.685, p < .001
Gender	.784	.743	-3.923	5.491	
Marital status	2.461	.300	-2.214	7.136	
Education	-.807	.754	-5.882	4.267	
Employment status	-.369	.883	-5.317	4.579	
Current smoking	1.283	.613	-3.719	6.285	
DHFKS	.286	.555	-.667	1.238	
Disease-related characteristics					
Mini-Cog	-.918	.759	-6.821	4.985	
Number of hospital admissions	.085	.893	-1.159	1.329	
MARS-5	2.003	.350	-2.213	6.219	
HADS Depression	-.165	.614	-.807	.478	
HADS anxiety	-.007	.982	-.627	.613	
Environmental characteristics					
MSPSS	.938	.465	-1.591	3.468	
Having family caregivers	.207	.938	-5.026	5.439	
Having paid caregivers	.532	.928	-11.095	12.160	
Other characteristics					
Physical activities status	10.130	<0.001**	5.461	14.798	
Participants’ opinion of internet and social media for cardiac self-care	.855	.556	-2.002	3.712	
Having other health problems that prevent cardiac self-care	-.151	.961	-6.174	5.872	
Clear advice on how to do self-care	2.098	.528	-4.453	8.648	
Comfortable with talking with doctors or nurses	3.874	.184	-1.857	9.605	

Variables used in dichotomised forms: MARS-5 class: inadequate (≥ 20) / adequate (< 20) adherence; Mini- Cog class: cognitively impaired (0-2)/ normal cognitive status (3-5); Marital status: married/ single; Education: educated/ no formal education; Employment status: employed/ unemployed; Physical activities: do physical activities/ no physical activities; Comfort talking to

doctors/ nurses: comfortable/ uncomfortable; Time for self-care: having time/ not having time for this; Use of internet & social media: use it/ not useful/ useful; * $P < 0.05$; ** $P < 0.001$

When self-care confidence was regressed on these variables, the self-care confidence model demonstrated statistical significance of F-value of 3.842 and $p < .001$. The R^2 of .234 suggested that the model explained 23% of the variance in self-care confidence. Personal characteristics of employment status was associated with self-care confidence, with lower self-care confidence linked to employed status ($\beta = -8.574$, $p = 0.013$). Disease-related characteristics played a significant role. Higher NYHA class was linked with higher self-care confidence ($\beta = 5.282$, $p = 0.011$). The number of hospital admissions in the previous year exhibited a marginally significant negative association with self-care confidence ($\beta = -1.851$, $p = 0.039$). A more substantial impact was observed in the number of medications taken per day, with an increase in the number of medications being significantly associated with a decrease in self-care confidence ($\beta = -1.806$, $p = 0.016$). Other factors, personal, environmental and disease-related, were not significantly associated with self-care confidence (See Table 17).

The model equation for self-care confidence was $= 22.990 - (8.574 \times \text{employment status}) + (5.282 \times \text{NYHA class}) - (1.851 \times \text{number of hospitals admissions}) - (1.806 \times \text{number of medications})$. The model indicates that for every one-unit increase in the "employment status" (i.e. employed versus non-employed), the self-care confidence score was expected to decrease by 8.574 units; for every one-unit increase in "NYHA class", the self-care confidence score was expected to increase by 5.282 units; for every one-unit increase in the "number of hospital admissions" (i.e. for every additional admission), the self-care confidence score was expected to decrease by 1.851 units; and for every one-unit increase in the "number of medications" (i.e. for every additional regular medication), the self-care confidence score was expected to decrease by 1.806 units.

Table 16: Multiple Regression Analysis on Self-Care Management (n=205)

	Unstandardised β	P	95.0% Confidence Interval		
			Lower Bound	Upper Bound	
Personal characteristics					F (11, 193) = 3.005, p < .001
Age	-.211	.155	-.503	.081	
Gender	-4.218	.129	-9.674	1.239	
Marital status	3.270	.238	-2.181	8.721	
Employment status	-4.276	.209	-10.967	2.415	
Disease-related characteristics					
CCI	1.442	.096	-.259	3.143	
HF duration	.807	.020*	.127	1.487	
Environmental characteristics					
Having family caregivers	.098	.975	-6.122	6.319	
Other characteristics					
Physical activities	-4.783	.098	-10.452	.885	
Clear advice on how to do self-care	2.309	.565	-5.596	10.214	
Comfortable with talking with doctors or nurses	9.144	.010*	2.196	16.091	
Availability of time	1.993	.433	-3.016	7.003	

Variables used in dichotomised forms: Marital status: married/single; Employment status: employed/unemployed; Physical activities: do physical activities/no physical activities; Comfort talking to doctors/nurses: comfortable/uncomfortable; Time for self-care: having time/not having time for this; Use of internet & social media: use it/not useful/useful; * $P < 0.05$; ** $P < 0.001$

Table 17: Multiple Regression Analysis on Self-Care Confidence (n=205)

	Unstandardised β	P	95.0% Confidence Interval		
			Lower Bound	Upper Bound	
Personal characteristics					F (15, 189) = 3.824, p < .000
Perceived adequacy of income	2.756	.280	-2.258	7.769	
Employment status	-8.574	.013*	-15.315	-1.833	
DHFKS	.525	.431	-.787	1.836	
Disease-related characteristics					
NYHA class	5.282	.011*	1.243	9.322	
Mini-Cog	4.689	.243	-3.216	12.594	
Number of hospital admissions	-1.851	.039*	-3.609	-.094	
Number of medications per day	-1.806	.016*	-3.269	-.343	
MARS-5	3.299	.281	-2.723	9.322	
HADS depression	-.152	.734	-1.031	.728	
HADS anxiety	-.603	.172	-1.471	.265	
Environmental characteristics					
MSPSS total score	2.941	.104	-.614	6.497	
Other characteristics					
Physical activities	1.495	.642	-4.841	7.831	
Having other health problems that prevent cardiac self-care	-1.876	.656	-10.163	6.412	
Clear advice on how to do self-care	1.543	.735	-7.450	10.536	
Comfortable with talking with doctors or nurses	6.669	.105	-1.413	14.751	

Variables used in dichotomised forms: Employment status: employed/ unemployed; Mini- Cog class: cognitively impaired (0-2)/ normal cognitive status (3-5); MARS-5 class: inadequate (≥ 20) / adequate (< 20) adherence; Physical activities: do physical activities/ no physical activities; Comfort talking to doctors/ nurses: comfortable/ uncomfortable; Time for self-care: having time/ not having time for this; * $P < 0.05$; ** $P < 0.001$

Chapter Six: Discussion

6.1 Introduction

This chapter presents a discussion of the study findings, triangulating and integrating results from both qualitative and quantitative studies (see Appendix 29: Triangulation and Integration of Study Findings). It begins with an overview of the participants' characteristics to evaluate the potential transferability and generalisability of the findings to the broader Middle Eastern HF population. The chapter then discusses the impact of HF on participants' daily lives, highlighting areas where changes are needed to improve self-care practices among HF patients in Saudi Arabia. The factors influencing self-care practices are analysed through the lens of the Situation-Specific Theory of Heart Failure Self-Care (Riegel & Dickson, 2008; Riegel et al., 2022), which considers personal, disease-related, and environmental factors. Subsequently, the study's strengths and limitations are presented and discussed.

6.2 Sample Characteristics

This is the first mixed methods study to explore how patients with HF perceive and practise self-care in Saudi Arabia. To contextualise the participants' sociodemographic profile, their characteristics were compared to those of earlier studies, revealing many similarities with other Middle Eastern research work. For example, the mean (SD) age of participants in the current study was 59.9 (13.6) years. This closely aligns with previous national studies on patients with HF in Saudi Arabia and the broader Middle East. In a cross-sectional study of 245 patients treated for HF at a tertiary heart centre in Saudi Arabia, the mean (SD) age was 56.51 (9.70) years (Aljohani, 2023). Similarly, a prospective prevalence-based study in Saudi Arabia with 369 HF patients from two large governmental centres reported a mean (SD) age of 53 (15) years (Alghamdi et al., 2021). Another cross-sectional study on health-related quality of life (HRQoL) that recruited 246 participants with HF treated at a tertiary heart centre in Saudi Arabia, found a mean (SD) age of 56.7 (10.9) years (Alharbi et al., 2022). Comparable age profiles were reported in other Middle Eastern countries: in three studies from Jordan, mean (SD) ages were 61.9 (12.6) years (Alkouri et al., 2022), 58.5 (11.7) years (Al-Hammouri et al., 2020), and 56.92 (12.29) years (Tawalbeh et al., 2017). In two studies from Lebanon, the mean (SD) ages were 72 (13) years (Deek et al., 2020) and 67.59 (12.09) years (Massouh et al., 2020), while a study from Iran reported a mean age of 66 years (Siabani et al., 2016). Thus, the age profile of participants in the

current study was consistent with those in other HF studies from Saudi Arabia and the broader Middle East.

In terms of gender, marital status and education, the majority of participants were male (67.5%) and married (74.4%), consistent with a previous national study in which 70% of HF participants were male and 79.6% were married (Aljohani, 2023). Similarly, earlier Middle Eastern studies also reported that most participants were male and married (Al-Hammouri et al., 2020; Aljohani, 2023; Alkouri et al., 2022; Massouh et al., 2020; Siabani et al., 2016; Tawalbeh et al., 2017). In the current study, nearly half of the participants were retired (42.9%), while only 22.4% were employed. Similarly, Alghamdi et al. (2021) found that 27% of their Saudi participants were employed, with the majority being retirees or unemployed. Regarding education, 27.3% of participants in this study had no formal education, 12.3% had completed primary education, and 44.7% had attained secondary, high school, or diploma-level education. Similarly, in the study by Alharbi et al. (2022) study, 49% of Saudi participants had an education level below secondary school.

Overall, the sociodemographic profile of this study's sample, in terms of age, gender, marital status, employment and education, closely mirrored that of other HF studies conducted in Saudi Arabia and the broader Middle East. This similarity strengthens the robustness of the findings, increasing their potential for broader transferability and generalisability to HF populations across the region.

6.3 Impact of Heart Failure on Everyday life

Interviews with participants revealed the significant impact of HF on various aspects of their daily lives, including physical, psychological, social, spiritual and occupational aspects. In interviews, participants reported experiencing a range of physical symptoms and limitations caused by HF, such as fatigue, shortness of breath, swelling of the extremities, decreased physical endurance, sleep disturbances and challenges in their sexual lives. These findings were corroborated by the survey results from a larger sample, where only 1% of participants reported having no issues with breathing or ankle swelling in the past month. The NYHA classification in the current sample aligned with these physical symptoms, with approximately 42.0% classified as NYHA class II, 11.7% as NYHA class III, and 0.5% as NYHA class IV; that is, most participants had mild-moderate HF, causing some limitations to physical activities or at least leaving them

comfortable at rest. Similar experiences have been documented in other studies (Malhotra et al., 2016; McHorney et al., 2021), where HF participants attributed their struggles with even simple tasks—such as walking, climbing stairs, and cleaning the house—to these physical symptoms. In a qualitative focus group study, McHorney et al. (2021) found that more than half of the participants reported fatigue and difficulty walking and climbing stairs as adverse effects of the disease. These symptoms often hindered their ability to perform daily activities.

Sleep disturbance was reported as an impact of HF in the current study. Participants struggled with inadequate sleep, either due to shortness of breath and tightness or because of overthinking and concerns about heart failure complications. Some participants were worried that their heart might stop while they slept. However, sleep disturbance was not examined in the survey. In patients with HF, sleep disturbance is characterised by difficulties in initiating and maintaining sleep, trouble staying asleep or resuming sleep because of frequent nocturnal arousals caused by HF symptoms, sleep-disordered breathing, insomnia and psychological distress (Zheng, 2021). Research indicates that approximately 75% of patients with HF experience sleep disturbances (Gau et al., 2011), with around 50% suffering from sleep disordered breathing (Siddique et al., 2023). These symptoms impact sleep quality and functional performance during the day (Jeon & Redeker, 2016). All of these symptoms can affect self-care and medication adherence, as evidenced by a recent systematic review of patients with HF (Spedale et al., 2020).

Participants in the current study reported a profound psychological impact from HF. Many expressed feelings of anxiety, depression, decreased motivation, anger, sadness, stress, changes in body image, low self-esteem, denial, and fear related to their condition and its progression. This aligns with the hospital anxiety and depression scale (HADS) scores from the survey, where approximately half of the participants (50.2%) fell into the 'depression' category. Regarding anxiety, a quarter of the participants (24.4%) were classified as experiencing anxious symptoms. The results are consistent with existing literature. A cross-sectional study involving 205 Saudi patients with HF attending a cardiology clinic in a government hospital found a depression prevalence of 52.7%; however, the anxiety rate was notably higher at 56.9% (Al Shamiri et al., 2023). Studies conducted on HF populations from various countries have consistently reported mental health sequelae, such as depression, sadness, fear of dying, and anxiety among these patients (Khan et al., 2015; McHorney et al., 2021; Psotka et al., 2016). Many current participants

also indicated that their diagnosis of HF significantly altered their self-esteem and confidence, adversely affecting their engagement in social and physical activities. They expressed concerns about being a burden to others and the impact of their condition on their families' well-being. Although these aspects were not assessed in the survey, other research has consistently found that participants with HF attribute negative emotions such as fear, frustration, unfairness, guilt and helplessness to their HF. Some expressed difficulty in accepting that their bodies would remain ill, leading them to avoid situations related to self-care in order to escape negative emotions. This avoidance often resulted in neglecting self-care practices, as they refused to engage with information about heart failure (Li et al., 2019).

In addition, heart failure greatly affected the social lives of the participants. Many experienced social isolation due to their physical limitations and the need to avoid situations that could exacerbate their symptoms, compounded by changes in self-esteem and confidence in engaging in social activities. Social interactions were often reduced, with participants focusing more on strengthening family bonds. This aligns with McHorney et al. (2021), who found that reduced social interactions led to feelings of loneliness and disconnection. Social isolation tends to worsen when individuals cannot participate in their cultural and social activities and are reluctant to seek help (Vaughan et al., 2013). In Saudi Arabia, where family and social groupings are integral, the social impact of HF can be particularly pronounced. The shift in focus towards family over community activities underscores the cultural importance of familial bonds in coping with chronic illness. Participants frequently shifted their focus towards family, prioritising familial bonds, meeting family needs, and spending more time at home over community engagement—a finding also reported in another study (Al Mutair et al., 2020). Many participants relied on their family members for social support and assistance with self-care tasks, which was also evident in the survey results, with 80% of participants reporting high levels of social support. Notably, the multidimensional scale of perceived social support (MSPSS) 'Family' subscale received the highest scores, followed by the 'Significant Other' and 'Friend' subscales.

Although the family was a significant source of support, it could also serve as a barrier to self-care when family members were not actively involved in HF management practices, placing additional burdens on the participant. In addition, some family actions that participants perceived as helpful were, in fact, detrimental to their self-care efforts. For example, some family members overprotected participants, which was perceived by the participants as a form of care.

Overprotection, commonly noted in the collectivist cultures of Middle Eastern countries, where close family ties and concern for loved ones are paramount, can hinder participants' confidence in engaging in self-care practices. This overprotection often increases patients' dependency and discourages their active participation in self-care. While it often stems from love and concern, it can have unintended negative consequences on the patients' autonomy and health outcomes. When patients are not encouraged to take responsibility for their own health management, it can lead to increased dependence and potentially poorer health outcomes (Al Mutair et al., 2020; Rosland et al., 2010).

Spirituality emerged as an important aspect of coping with HF for many participants. In Saudi Arabia, where religious beliefs and spiritual practices are deeply integrated into daily life, acts of worship such as prayer, fasting, and going to Hajj are integral to health and wellness routines. Many participants highlighted the positive impact of religious beliefs and practices on their self-care. For instance, regular prayer provided not only spiritual solace by providing reassurance and relieving negative feelings but also structured periods of physical activity. Religious fasting, when properly managed, was also seen as an opportunity to practise discipline that could extend to dietary habits. After diagnosis, most interview participants reported turning to their faith, focusing on discovering new meaning and redefining personal goals for comfort and strength. Spiritual practices provided a sense of peace and hope. For some, spirituality also influenced their approach to self-care, encouraging them to view managing their health as a form of stewardship of their bodies. This finding was consistent with Islamic teachings, which stated that the body is regarded as a trust from God, with humans acting as stewards and trustees (Dols, 1988). Consequently, Muslims are encouraged to maintain good health, avoid harm, and engage in practices that promote overall well-being, with the idea that both physical and spiritual life are divine gifts and humans are responsible for their care (Dols, 1988). Spirituality surfaced as a key cultural element that helped shape self-care practices. The internal aspect of spirituality was reflected in the reliance on prayer for guidance and the faith that one's needs will be met by God, and the external aspect of spirituality manifested through religious ties or participation in religious activities, all supporting self-care, where they were seen as aligning with medical advice and treatment adherence (Vaughan et al., 2013).

However, many participants believed in fatalism and relied on God's will regarding their health, which affected their self-care practices both positively and negatively. On one hand, it

provided comfort and reduced anxiety by placing trust in a higher power. On the other hand, it led some individuals to neglect their treatment, as they felt their efforts would not change the outcome if everything was viewed as predetermined by God's will. This reliance on fatalism sometimes conflicted with medical advice, resulting in a reluctance to adhere to prescribed treatments, and belief in fatalism and reliance on God was a dominant characteristic of these participants. While this belief system reassured participants, it also acted as a barrier to self-care, as some believed that no change would occur, whether or not they were committed to self-care practices. The role of religion in HF self-care adherence could not be examined in the survey, as all participants shared the same religion, Islam. However, previous research (Vaughan et al., 2013) has indicated that religious beliefs significantly influence self-care practices through personal spiritual practices like prayer and organised religious activities, which often promote adherence to medical advice and overall well-being. Furthermore, the role of fatalism has been examined to determine whether it mediates the relationship between symptom burden and self-care adherence in patients HF. Findings suggest an indirect pathway: participants with a higher symptom burden tended to more fatalistic views, and greater fatalism was associated with poorer self-care adherence (Thapa et al., 2024).

The impact of HF on employment was significant for many participants. The physical and psychological limitations imposed by the condition often made it challenging to maintain a full-time job or pursue career advancement. Some participants expressed that they had to reduce their working hours, shift to less demanding roles, retire early, or leave the workforce altogether. These findings align with the survey results, which indicated only 22.4% of participants were employed either full-time or part-time. Approximately 42.9% of participants were retired, with 12.6% retiring before the official retirement age of 60 in Saudi Arabia. The impact of HF on employment status in this study was consistent with past research, where most participants reported that the burden of HF, including its symptoms and associated health limitations, interfered with their ability to perform work functions. This interference often prevented them from returning to work or remaining active employees. Cognitive issues, such as lack of concentration and forgetfulness, along with fatigue and activity intolerance, made work particularly difficult, especially in physically demanding roles (Dickson, 2008; Heo et al., 2009).

6.4 HF Self-Care Practices and Deficits

The current study applied the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2016; Riegel & Dickson, 2008; Riegel et al., 2022) to explore how patients with HF in Saudi Arabia perceive and practise self-care. This theory was found to be relevant and useful in providing a structured framework for exploring the self-care practices of patients living with HF in Saudi Arabia. It also supported the identification of factors influencing self-care within the specific cultural and regional context of the Middle East, thereby aligning with the aims of this study.

The overall level of self-care among Saudi participants was found to be inadequate, with all median sub-scale scores falling below the threshold score of 70, which indicates adequate self-care (Riegel et al., 2022; Riegel et al., 2009). Only 3.4%, 8.8%, and 22.9% of participants surpassed the threshold scores for the self-care maintenance, management, and confidence subscales, respectively.

6.4.1 Self-Care Maintenance

Self-care maintenance refers to the process of maintaining physiological stability, monitoring symptoms and adherence to treatment. In this study, the median (IQR) self-care maintenance score among participants was 43.3 (23.3) and mean (SD) was 44.4 (14.0). When compared with other countries, the participants in this study demonstrated better self-care maintenance than those in some other countries such as Iran, where participants with HF had a mean (SD) score of 33.8 (10.7) (Siabani et al., 2016). Their score was similar to reports from China, where the mean (SD) was 44.00 (17.83) (Zhang et al., 2023). However, the self-care maintenance score in this study was lower than a previous study conducted in Saudi Arabia, which reported a mean score (SD) of 59.4 (16.2) for self-care maintenance. It was also lower than findings from other countries, where mean self-care maintenance scores ranged from 53.9 to 67.5 (Cameron et al., 2009; Cocchieri et al., 2015; Graven et al., 2019; Lee et al., 2019; Massouh et al., 2020; Tawalbeh et al., 2017; Tung et al., 2012; Vaughan et al., 2013). Self-care maintenance behaviours can vary significantly across countries due to differences in culture, society, and healthcare systems, as well as variations in the tools used to measure self-care maintenance. Additionally, differences in the translation and interpretation of survey questionnaires may contribute to these disparities.

Consistent with the survey results, while some participants reported engaging in various self-care practices, such as adhering to their medication regimen, attending doctor or nurse appointments, following a low-salt diet, and participating in physical activities, many acknowledged that they struggled to maintain these practices. For instance, some participants admitted to not adhering to their prescribed medication regimen, failing to follow a low-salt diet, skipping physical activities, and neglecting daily weight checks. Additionally, practices such as checking for ankle swelling, requesting low-salt options when dining out or visiting others, restricting fluid intake, and avoiding illness (e.g., getting a flu vaccination and steering clear of sick individuals) were not reported by participants as part of their HF self-care during the interviews. Nevertheless, participants highlighted other important self-care practices during the interviews, including seeking information, achieving a balance between work and rest, quitting smoking, establishing a good sleep routine, and managing stress.

Medications are a cornerstone of HF management and adherence to medication regimens is a crucial element of HF self-care maintenance. Many participants recognised the necessity of taking medications as prescribed to control their condition and prevent complications. To maintain adherence, some employed strategies such as keeping medications easily accessible, linking them to mealtimes or setting mobile alarms. Despite this, many participants reported difficulties in consistently taking their medications. Factors contributing to non-adherence included misunderstanding instructions, side effects, forgetfulness and complex regimens. For instance, one participant believed they were adhering to their schedule by not missing doses but overlooked the importance of timely intake, while another stopped their HF medications without consulting a doctor, thinking they no longer needed them. Consistent with the experiences shared by participants in the interviews, the medication adherence report scale (MARS-5) revealed that 62.9% of participants scored below 20, indicating inadequate adherence to their medication regimen. This finding aligned with Raffaa et al. (2020), which noted that over half of Saudi patients with HF exhibited poor adherence, with only 7.3% demonstrating high adherence; the primary reason for poor adherence was forgetting to take medications. However, in the current study, only 16.1% of participants reported frequently or always forgetting their medicines, 39.5% reported sometimes forgetting, and about half utilised systems such as pillbox reminders to help with their medication adherence.

Another essential aspect of HF self-care management is maintaining regular check-ups with healthcare providers (Jonkman et al., 2016; Wiśnicka et al., 2022). Participants in this study emphasised the importance of adhering to medical advice and attending scheduled appointments as key self-care practices. They reported that closely following medical recommendations, asking questions when uncertain, and keeping regular check-ups helped them better manage their condition. However, some participants expressed concerns that certain advice was exaggerated, indicating a degree of distrust. Despite this, they recognised the importance of attending appointments, even if they did not fully follow all recommendations. Survey results supported these findings, showing that 87.8% of participants frequently or always attended their appointments. This indicated that, despite some scepticism, the majority still understood the value of regular consultations in managing their HF.

This adherence underscores that healthcare providers should use this opportunity to build stronger, more trusting relationships with patients, ensuring that their advice is both understood and followed. In Saudi Arabia, the reliance on expatriate healthcare providers—38% of physicians and 30% of nurses in Ministry of Health hospitals are non-Saudi nationals (Hamadi et al., 2024)—can lead to communication challenges due to linguistic and cultural differences. These disparities can impact patient satisfaction, care quality and safety, especially when language barriers exist (Al Shamsi et al., 2020). Therefore, it is crucial that healthcare providers are culturally and linguistically competent to bridge gaps and improve patient outcomes (Nair & Adetayo, 2019; Stubbe, 2020). Additionally, varying education levels among patients can affect their ability to understand medical advice and engage in self-care. In this study, 39.7% of participants were illiterate or had only a primary education, potentially hindering effective communication and adherence. Therefore, healthcare providers must tailor their communication strategies to align with patients' educational levels to ensure comprehension (Kwame & Petrucka, 2021; Ricci et al., 2022). A recent study (Almotairy et al., 2024) found that patients with HF in Saudi Arabia rated nurse practitioners higher than physicians in four domains: access to care, communication with healthcare providers, care coordination, and being helpful, courteous and respectful. This suggests that nurse practitioners may be more effective in certain aspects of care, likely due to their training and patient-centred approach (Kwame & Petrucka, 2021). A multidisciplinary approach, with both physicians and nurse practitioners playing

complementary roles, is thought to be essential for enhancing patient care in HF management (AlHabeeb et al., 2019).

Another essential aspect of HF self-care is adherence to dietary requirement (Wickman et al., 2021). In interviews, participants reported efforts to adopt healthier habits, such as reducing sodium and avoiding foods high in saturated fats. However, cultural and social contexts, particularly in Saudi Arabia, often influenced dietary choices, with traditional preferences and family dynamics affecting adherence to dietary recommendations. Many participants struggled to follow low-sodium diets due to cultural preferences, limited access to low-sodium foods, and a lack of knowledge about sodium content. Survey results reflected this, with only 50% of participants adhering to low-salt diets. HF symptoms in this study and other research were often perceived as stress-induced or unavoidable, reducing the perceived importance of dietary changes (Vaughan et al., 2013). While sodium and fluid restrictions are important for managing HF and preventing fluid overload, excessive restrictions can have negative effects, such as increased thirst and nutritional deficits (Aliti et al., 2013). Thus, dietary plans must be individualised, based on the patient's HF stage, symptoms and comorbidities (Wickman et al., 2021). Recent studies have emphasised the need to consider other components of a healthy diet beyond sodium and fluid restrictions for patients with HF (Colin-Ramirez et al., 2024; Driggin et al., 2022).

Regular physical activity was identified as an important self-care practice, with participants reporting that they exercised outdoors in parks, farms, designated walkways, at the gym or at home to improve cardiovascular health. Participants also placed a high value on social gatherings for activities such as exercising and engaging in conversation rather than spending time alone; they expressed a preference for exercising with companions, highlighting important cultural aspects that influence self-care behaviours. Social interaction during physical activity, such as walking with friends or family, was a favoured approach, reflecting the communal nature of Saudi culture. Such specific cultural considerations should be emphasised when developing interventions to enhance engagement in self-care. Tailoring exercise programs that incorporate group activities or social support may improve adherence to physical activity and overall self-care in HF management, as they align with cultural values and preferences. However, maintaining a consistent exercise routine was challenging for some, particularly due to physical limitations and cultural and environmental factors in Saudi Arabia. Survey results reflected this,

with only approximately half of the participants frequently engaging in physical activity. The most common forms of exercise included walking outdoors alone (32.2%) or with friends and family (31.2%).

Many participants lacked adherence to daily weight checking, which emerged as a significant self-care deficit. This interview finding was supported by survey findings indicating that 28.8% of participants never weighed themselves, 68.3% did so sometimes or frequently, and only 2.9% always weighed themselves. Additionally, other self-care maintenance behaviours, such as checking for ankle swelling, restricting fluid intake, requesting low-salt options when dining out, and avoiding illness, were also inconsistently reported. Similarly, in the survey, 25.9% never checked their ankles for swelling, 59.1% did so sometimes or frequently, and only 15.1% always checked. Furthermore, 52.7% never asked for low-salt items when dining out, while 43.4% did so sometimes or frequently, and only 3.9% always did. Regular weight monitoring, checking for ankle swelling, and restricting fluid intake are crucial self-care behaviours for patients with HF to detect fluid retention and prevent exacerbations. However, many participants did not consistently engage in these practices, due to a lack of understanding of their importance, forgetfulness, or logistical challenges, such as not having access to a reliable set of scales. Previous studies have shown similar deficiencies in self-care behaviours related to daily weight monitoring (McHorney et al., 2021). In a study conducted in Poland, less than half of patients reported using non-pharmacological methods for HF management, such as fluid restriction and daily weight monitoring, often believing that pharmacological treatment alone was sufficient (Wiśnicka et al., 2022). Seid et al. (2019) also found that only about a third of patients with HF adhered to self-care and non-pharmacologic treatment recommendations in Ethiopia.

Low adherence to these practices may stem from a lack of knowledge about HF pathophysiology or an inability to recognise signs and symptoms of worsening disease. This was evident in participants' inability to provide valid responses to questions about the frequency of weighing themselves, the importance of regular weight monitoring, and recommended daily fluid intake. A large secondary analysis of HF self-care data pooled from 22 studies across the US, Europe, Australasia, and South America indicated that many patients with HF faced challenges in maintaining regular weight checks and had not received specific education about their symptoms or the importance of monitoring them (Jaarsma et al., 2013). The factors that

significantly influenced self-care maintenance of the participants in the study sample are discussed later in this chapter.

Nevertheless, interview data from the current study revealed several key self-care maintenance practices crucial for effectively managing HF. These practices included information-seeking, avoiding stress, establishing a healthy sleep routine, balancing work and rest, avoiding stress and quitting smoking. Patients actively sought information about HF to better understand their condition and necessary lifestyle changes. They pursued information from various sources, including healthcare professionals, relevant books, online resources, health-related television programs, and support groups. Such proactive behaviour is fundamental to effective self-care, as it empowers patients with knowledge about their disease, medications—including effects and potential side effects—treatment options, heart-healthy dietary practices, and the importance of adhering to prescribed regimens (Vainauskienė & Vaitkienė, 2021). Subsequently, mortality rates and hospital readmissions might be reduced if patients with HF had better knowledge about their self-care (Schweitzer et al., 2007). Participants referred to quitting smoking, and while 24.4% of participants were current smokers, some had made several unsuccessful attempts to quit. This smoking rate was higher than shown in a recent systematic review and meta-analysis that indicated around 16% of patients continued smoking after a diagnosis of HF (Son & Lee, 2020). This self-care deficit highlights the complexities of behaviour change, particularly regarding addictive behaviours like smoking. In the current study, smoking was not significantly associated with self-care maintenance and this was consistent with findings from Brazil that indicated smoking was not significantly related to self-care maintenance or confidence (Gomes da Silva et al., 2023).

6.4.2 Self-Care Management

Self-care management entails addressing symptoms as they manifest. In this study, the median (IQR) score for self-care management among participants was 45.0 (20.0), while the mean (SD) was 45.7 (17.1). The self-care management scores were higher than self-maintenance scores, which aligns with existing literature. Individuals have been shown to be more likely to engage in self-care behaviours when experiencing worsening symptoms rather than to maintain self-care when their health is stable or asymptomatic (Auld et al., 2018). Nonetheless, the mean and median self-care management scores were significantly below the threshold of 70, indicating inadequate self-management. These results are less favourable than those reported in a study

from Saudi Arabia (Aljohani, 2023), which documented a mean (SD) self-care management score of 67.5 (16.3), and from other countries, where self-care management scores ranged from 50.0 (16.6) to 66.96 (21.29) (Cameron et al., 2009; Cocchieri et al., 2015; Graven et al., 2019; Massouh et al., 2020; Tawalbeh et al., 2017; Vaughan et al., 2013; Zhang et al., 2023). However, participants in this study exhibited better self-care management compared to findings from some other countries; for example, South Korea and Iran, where mean (SD) self-care management scores were 40.2 (17.5) (Lee et al., 2019) and 32.2 (12) (Siabani et al., 2016), respectively. The differences in self-care management scores may reflect variations in the availability of robust healthcare infrastructure, better health education, differential access to healthcare, and stronger cultural and social support for self-care, all discussed later in this chapter. Additionally, the patients' characteristics and tools used for measuring self-care management may also contribute to these disparities.

Participants' responses to the individual survey questions mirrored their overall self-care management scores. Notably, 8.8% of participants did not recognise their symptoms, while others acknowledged them, but 23.9% did not identify them promptly. Only 30% of participants could recognise the symptoms of HF exacerbation "quickly" or "very quickly"; an important finding, as timely symptom recognition is crucial for effective self-care decision-making (Riegel & Dickson, 2008). In response to symptom exacerbation, nearly 80% of participants indicated they would likely call their healthcare provider for guidance, and around 78% reported they would take an extra water pill, aligning with findings from Iran (Siabani et al., 2016) but differing from other studies (Massouh et al., 2020). This discrepancy may stem from relatively easy access to healthcare services including pharmacies, and relatively lower medication costs, allowing patients to seek timely medical advice from healthcare professionals or pharmacists in Saudi Arabia and Iran (Hasan et al., 2021). However, participants were less likely to report reducing salt and fluid intake, as also observed earlier in relation to self-care maintenance. This may be linked to the treatment-oriented culture in Saudi Arabia, where individuals tend to rely on healthcare providers for health restoration rather than prioritising preventive care and assuming personal responsibility for managing their conditions, e.g. through dietary or fluid modification (Aljawyad et al., 2022; Leong et al., 2022). Additionally, participants had varying levels of certainty about the effectiveness of home remedies: 20.0% were unsure, 17.6% did not recognise their

effectiveness quickly, and only 4.9% recognised their effectiveness very quickly. As influences on self-care management, these factors are discussed later in this chapter.

6.4.3 Self-Care Confidence

Self-care confidence refers to individuals' perceived ability to perform self-care maintenance and management behaviours. In the current study, participants reported median (IQR) scores for self-care confidence of 55.6 (27.8) and mean (SD) of 54.0 (20.4). These scores were higher than those reported in studies from Korea (Lee et al., 2019), Jordan (Tawalbeh et al., 2017), China (Zhang et al., 2023) and the US (Vaughan et al., 2013), where mean self-care confidence ranged from 41.2 to 52.6. Study scores were comparable to those from Italy (Cocchieri et al., 2015), which reported a mean of 54.6. However, these results were less favourable than those reported in another study from Saudi Arabia (Aljohani, 2023), which documented a mean (SD) self-care confidence score of 77.5 (18.1). Study scores were also lower than those from the US (Graven et al., 2019) and Lebanon (Massouh et al., 2020), where mean self-care confidence scores ranged from 64.1 to 83.8. These differences in self-care confidence may arise from various factors, including individual experiences and skills acquired through direct involvement in self-care situations. Additionally, cultural attitudes toward self-care, healthcare infrastructure, access to health education, and social support systems can also contribute to the observed disparities. As influences on self-care management these factors are discussed later in this chapter.

Participants also reported very low confidence in their ability to remain free from HF symptoms, with 21.5% indicating they were not confident and only 6.3% expressing extreme confidence. They also lacked confidence in evaluating the importance of symptoms and taking action to relieve them, with 10.7% not confident. Recognising changes in their health when they occurred was also scored poorly, as was following treatment advice. The greatest confidence was expressed for evaluating the effectiveness of a remedy, with only 3.4% not confident. These responses highlight the diverse levels of confidence among participants in managing HF and related self-care aspects, suggesting the need for an individualised approach to supporting patients in their self-care practices. However, information on participants' confidence regarding keeping themselves free of HF symptoms, following treatment advice, assessing the importance of symptoms, recognising changes in their health when they occur, taking actions to relieve symptoms, and evaluating the effectiveness of treatment did not emerge from the interviews.

6.5 Personal, Disease-Related and Environmental Factors Influencing Self-Care Adherence in Saudi Participants

Although nineteen potential predictor variables were significantly associated with self-care maintenance in bivariate analyses, only one factor remained statistically significant in the multiple regression model. Engaging in physical activity compared to no exercise was significantly linked with better self-care maintenance ($p < 0.001$). Two of eleven factors remained statistically significantly associated with self-care management in the multiple regression model: longer HF duration ($p = 0.020$) and feeling comfortable to ask questions and discuss concerns with doctors or nurses ($p < 0.010$) were significantly associated with better self-care management. Four of fifteen factors remained statistically significantly associated with self-care confidence in multiple regression modelling: being unemployed ($p = 0.013$), at higher NYHA class ($p = 0.011$), fewer number of hospital admissions ($p = 0.039$) and a lower number of medications ($p = 0.016$) taken per day were significantly associated with better self-care confidence. These models explained 21%, 14%, and 23% of the variance in self-care maintenance, self-care management, and self-care confidence, respectively. Despite this, self-care maintenance was better than in the national study with 15% for both self-care maintenance and confidence, but was lower in self-care management, with 21% (Aljohani, 2023). The highest percentage of explained variance was reported by Tawalbeh et al. (2017) with 81%, 67% and 76% for self-care maintenance, management and confidence respectively. Compared to the current study, lower percentages ranging from 10% to 23% were reported for the self-care maintenance model in (Cocchieri et al., 2015; Davis et al., 2015; Graven et al., 2019; Lee et al., 2019; Tung et al., 2012). For the self-care management model, reported percentages ranged from 10% to 16% (Cocchieri et al., 2015; Graven et al., 2019; Tung et al., 2012). For self-care confidence, the studies by (Cocchieri et al., 2015; Davis et al., 2015; Zhang et al., 2023) reported similar percentages, ranging from 14% to 19. While the current study identified statistically significant independent associates of self-care adherence, a substantial percentage of the variance remained unexplained in each of the SCHFI self-care maintenance, management and confidence models. Further research is needed to identify other unknown factors that may influence and better explain self-care adherence among Saudi patients with HF.

Factors identified as significant in the current study did not always match expectations based on literature from other countries that used regression analysis. This emphasises the importance

of local data, as several factors that were consistently significant in previous research, such as participant's age and HF knowledge, did not appear to be significant in this study. Additionally, several factors identified in the interviews were not addressed in the Situation-Specific Theory of Heart Failure Self-Care. Despite the apparent broad alignment between the factors of the SCHFI with this study's findings, these somewhat unexpected findings, combined with the lack of comprehensive psychometric testing of the SCHFI in the cultural context of Saudi Arabia, raises concerns about whether the tool, in its current Arabic configuration, is well-suited for this population.

6.5.1 Personal Characteristics

Of eleven personal factors (age, gender, marital status, living circumstances, perceived adequacy of income, employment, education, current smoking, DHFKS, physical activity engaged in and availability of time) examined in the regression analysis modelling, only two—physical activity and employment status—remained statistically significant predictors of self-care practice. Eight personal factors (age, gender, marital status, living circumstances, perceived adequacy of income, education, current smoking and HF knowledge) shown to be independent significant factors in other studies were not significant for these Saudi Arabian participants with HF. Although 'other' factors were identified in the phase one interviews (physical activity engaged in and availability of time), physical activity remained a statistically significant predictor of self-care practice, while availability of time was not shown to be independently statistically significant.

Participants who engaged in physical activity, compared to those who did not exercise, demonstrated significantly increased self-care maintenance ($p < 0.001$). Physical activity may have acted as a motivational enhancer, improving both physical and mental health among participants. Regular physical activity and exercise have been shown to improve quality of life, clinical outcomes, and life expectancy in patients with HF (Morris & Chen, 2019). Additionally, exercise likely improved participants' tolerance to physical activities and thereby their ability to engage in self-care activities without experiencing fatigue. Research has shown that regular physical activity is associated with better self-care practices, including healthier diets, regular health check-ups, and adherence to medical advice. Regression analyses in these studies often identified physical activity as a significant predictor of various self-care behaviours (Liu et al., 2023; Lukitasari & Nafista, 2023).

Employment status was a statistically significant independent predictor of self-care confidence, with employed participants reporting lower self-care confidence ($p = 0.013$). This finding aligns with earlier studies that demonstrated an association between employment and lower self-care confidence (Massouh et al., 2020) as well as reduced self-care behaviours (Kato et al., 2009). These outcomes may be due to time constraints, stress, fatigue, and limited access to healthcare resources during working hours. Similarly, Dickson (2008) explored self-care attitudes among employees with HF and found that employed participants exhibited poorer self-care habits compared to their unemployed counterparts. The pressures of maintaining exercise routines and adhering to low-sodium diets were particularly affected, with employed individuals more frequently opting for convenient food choices due to time limitations (Dickson, 2008). However, contrasting findings have been reported in other studies; for example, being unemployed has been linked to lower self-care maintenance (Tawalbeh et al., 2017), management (Cocchieri et al., 2015; Tawalbeh et al., 2017) and confidence (Tawalbeh et al., 2017). Research from Jordan and Italy found that employment was associated with better self-care behaviours, potentially due to the structured routines, financial security, and social support provided by work. On the other hand, in Saudi Arabia and Korea (Aljohani, 2023; Ok & Choi, 2015) studies found no association between employment and self-care adherence, possibly explained by strong family support systems or access to universal healthcare.

Interestingly, in the present study, employment was associated with self-care confidence but not with self-care maintenance or management. A plausible explanation for this finding in the present study might be that employment impacts individuals' perceived competence in managing self-care rather than their actual ability to perform self-care tasks. In the Saudi context, where family obligations are significant, employed individuals may prioritise work and family responsibilities over personal health care, resulting in diminished self-care confidence. Busy work schedules and job demands may leave patients feeling overwhelmed, undermining their decision-making abilities and self-care confidence (Dickson, 2008). This role strain, in which individuals are torn between professional responsibilities and personal health, may contribute to reduced confidence in effectively managing their health.

In the interviews, participants generally demonstrated a lay understanding of HF as a serious, chronic condition that requires ongoing self-care. They recognised basic symptoms such as fatigue, shortness of breath and swelling, and understood the importance of adhering to

prescribed medications and lifestyle modifications. However, the depth and accuracy of their knowledge varied significantly. While some participants possessed a comprehensive understanding of the disease—its causes, progression, and management strategies—others exhibited gaps in their knowledge, particularly regarding the importance of dietary restrictions, physical activity, daily weighing, early detection of symptoms, and when to seek medical attention. This fluctuation was also reflected in the survey results, with DHFKS scores ranging from 4 to 14 out of 15. Sedlar et al. (2021) reported that knowledge contributed positively to HF self-care practices. Similarly, in the current study, significant knowledge gaps about the disease and its management hindered patients' ability to take appropriate self-care actions. Many expressed worries about the lack of sufficient information on self-care and healthy alternatives, and some exhibited knowledge gaps by making inaccurate statements, commonly on the purpose of daily weight measurement, with many believing that it was only for weight loss or to maintain the ideal weight rather than for monitoring body fluids. A lack of knowledge and experience often led to uncertainty about the extent of permissible physical exertion in the current study, while difficulties in establishing new habits could impede the adoption of healthier lifestyles (Sedlar et al., 2021). Perceptions regarding the treatability of HF were observed among some participants, who stated that HF is a temporary problem that would resolve with treatment, rather than recognising it as a chronic cardiovascular condition that requires ongoing management. This finding aligns with another recent study conducted in Saudi Arabia, which found that around half of the participants were unaware that HF is a disease process rather than a natural occurrence (Alshammri et al., 2023).

Self-care practices among the participants in this study were generally inadequate, highlighting a significant discrepancy between perceived importance and actual behaviours. A prevalent tendency was observed among participants to maintain a reassuring demeanour, often asserting that everything was under control and tending to deny or underestimate their personal risk. This finding has important implications for practice and underscores the critical need for patient education to assist these individuals in developing an appropriate level of risk perception. However, HF knowledge was not significantly associated with self-care maintenance and confidence, consistent with Kato et al. (2009)'s study that showed no significant relationship of HF knowledge with self-care behaviour adherence among patients with HF in Japan. However, inadequate HF knowledge was more consistently linked to inadequate self-care adherence: as a

determinant of inadequate self-care maintenance in all four studies that examined it (Al-Hammouri et al., 2020; Davis et al., 2015; Massouh et al., 2020; Tawalbeh et al., 2017); of inadequate self-care management (Tawalbeh et al., 2017) and self-care confidence (Massouh et al., 2020; Tawalbeh et al., 2017); and of inadequate self-care behaviours in Taiwan and Korea (Liu et al., 2014; Ok & Choi, 2015). Insufficient self-care often stems from misunderstandings, misconceptions, and a lack of knowledge (Riegel et al., 2021). Participants' inability to respond appropriately to exacerbating HF symptoms and their uncertainty about when to seek help may be addressed through targeted patient education (Riegel et al., 2021). This approach aligns with the Situation-Specific Theory, which posits that informed patients are more likely to engage in self-care behaviours. According to the naturalistic decision-making theory, each decision is made based on past experiences and the information currently available (Riegel et al., 2013). Thus, patients with HF typically acquire heart failure-specific knowledge and apply it to self-care situations, drawing upon their previous skills to make informed decisions about their care (Riegel & Dickson, 2016). Lack of knowledge about the disease has been found to negatively affect confidence in the ability to adhere to self-care; consequently, patients with higher health literacy tended to have greater confidence in their self-care practices, which may increase the likelihood of their engagement in effective self-management (Chen et al., 2011).

Another factor that emerged as an important influence on the self-care practice of participants in the interviews was the availability of time. Participants who effectively managed their time found it easier to incorporate self-care into their daily routines, such as cooking healthy meals and exercising. Conversely, many participants reported a lack of time due to personal and professional commitments, which hindered their ability to prioritise their health needs. However, whilst the availability of time was significant in univariate analysis for self-care maintenance and management, it did not remain significant in the multiple regression analyses. Managing heart failure is a time-intensive process that requires essential activities such as medication adherence, dietary follow-up, and regular exercise, all of which need sufficient time and effort (Jaarsma et al., 2017; Riegel et al., 2011). Research indicates that patients with HF struggle to integrate self-care into their daily routines due to multiple responsibilities (Clark et al., 2014). Research has shown that the demands of a busy life and limited time can significantly hinder patients' adherence to self-care routines (Chew et al., 2019).

Additionally, participants' personal motivation to engage in self-care emerged as an important factor in facilitating self-care behaviours. Those who experienced positive outcomes from their treatments demonstrated a stronger commitment to adhering to self-care routines and were motivated to continue their regimen. Many participants expressed motivations such as a desire for wellness, happiness, and spending time with family. Sedlar et al. (2021) also found that strong motivation positively contributed to self-care practices. However, personal motivation did not show a significant association with self-care practices in the survey. A possible reason for this discrepancy might be related to health literacy, which a recent study showed was relatively low among the Saudi population; this might affect their understanding of the importance of self-care (Alahmadi, 2023). Additionally, cultural norms and expectations might lead some individuals to prioritise family and social responsibilities over personal health, making it difficult for them to focus on self-care (Mutair et al., 2014) (see Appendix 30: A Venn Diagram to Illustrate Triangulation of the Integrative Review, Qualitative and Quantitative Findings for Personal Factors).

6.5.2 Disease-Related Characteristics

Of ten disease-related factors—(HF severity (NYHA class), co-morbidities (CCI score), cognitive function (Mini-Cog), HF duration, number of hospital admissions in the last year, number of medications per day, medication adherence (MARS-5), HADS depression and HADS anxiety, and having other health issues that hinder engagement in cardiac self-care)—examined in the regression analysis, four remained statistically significant predictors of self-care practice: HF severity (NYHA class) and duration, number of hospital admissions in the last year and number of medications per day. Five disease-related factors (co-morbidities, cognitive function, medication adherence, depression and anxiety), shown to be independent significant factors in other studies, were not significant for these Saudi Arabian participants with HF. One 'other' factor identified in the Phase One interviews (having other health issues that hinder engagement in cardiac self-care) was also not shown to be independently statistically significant.

Longer heart failure duration showed a significant association with better self-care management, which was consistent with findings from Tawalbeh et al. (2017) that shorter disease duration was highly significantly predictive of lower self-care management but not self-care confidence or maintenance. However, disease duration was not significantly associated with self-care management in two (Aljohani, 2023; Vaughan et al., 2013) of three other studies that

examined this. However, there were conflicting results for HF duration, with shorter time since diagnosis significantly associated with inadequate self-care maintenance in two studies (Cocchieri et al., 2015; Siabani et al., 2016), but in two other studies, not predictive of self-care maintenance (Aljohani, 2023; Vaughan et al., 2013) or self-care behaviours (Uchmanowicz et al., 2017). This pattern may be explained by the greater experience and skills accruing with longer duration of living with the disease not necessarily being reflected in confidence or motivation to change behaviour.

The number of hospital admissions in the previous year exhibited a marginally significant negative association with self-care confidence ($p = 0.039$) but not self-care maintenance. This was consistent with a study showing that each further hospitalisation was associated with inadequate self-care confidence (Gomes da Silva et al., 2023). Although one study showed no recent hospitalisation associated with better self-care confidence (Massouh et al., 2020), there was no association seen with self-care maintenance or management (Massouh et al., 2020). Conversely, greater numbers of hospital admissions were statistically significantly associated with better self-care management (Siabani et al., 2016) and with inadequate self-care behaviours in a study using EHFSBS-9 scores (Uchmanowicz et al., 2017). No association was seen with self-care maintenance, management or confidence in the studies by Aljohani (2023); Tawalbeh et al. (2017); Zhang et al. (2023), or with EHFSBS-12 scores (Gallagher et al., 2011; Getachew et al., 2022; Kato et al., 2009). These inconsistent findings may reflect differences in management practices and admission criteria as much as individuals' self-management expertise.

In this study, higher NYHA class was linked with better self-care confidence ($p = 0.011$) but other studies showed contradictory findings for the effects of HF severity or functional limitation. More severe HF symptom severity and a higher NYHA classification was a significant predictor of better self-care maintenance in the US and China (Davis et al., 2015; Zhang et al., 2023), while one study conducted in Lebanon found HF patients with lower NYHA class I or II had significantly better self-care maintenance (Massouh et al., 2020). Although severe NYHA class was associated with better self-care management (Davis et al., 2015), it predicted inadequate self-care management (Cocchieri et al., 2015) and significantly lower self-care behaviours in Poland (Uchmanowicz et al., 2017). However, consistent with the systematic review by Sedlar et al. (2017), NYHA class was not associated with self-care behaviours in six other studies, from the Netherlands, Ethiopia, Japan, Germany and Korea (Gallagher et al., 2011; Getachew et al., 2022;

Kato et al., 2009; Muller-Tasch et al., 2018; Ok & Choi, 2015; Son et al., 2018). Also, an increased LVEF score was associated with better self-care maintenance and confidence (Gomes da Silva et al., 2023) and higher functional status predicted inadequate self-care behaviours (Ok & Choi, 2015), but no association was seen with any SCHFI subscale (Vaughan et al., 2013). Clearly, multiple and conflicting underpinning influences were at play.

A more substantial impact was observed in the number of medications taken per day, where increased numbers of medications were significantly associated with decreased self-care confidence ($p = 0.016$). This was consistent with findings from Gomes da Silva et al. (2023), where each additional medication was significantly associated with increasingly inadequate self-care confidence but not self-care maintenance. A possible explanation for this result might be the perceived complexity or severity of condition of managing multiple medications, which can be overwhelming. This complexity is associated with inadequate self-care maintenance and confidence (Pancani et al., 2018). However, fewer medications (possibly a proxy for lesser symptom severity) were significantly associated with inadequate self-care maintenance and confidence (Cocchieri et al., 2015). In the current study, medication adherence reported as MARS-5 scores was significantly associated with self-care maintenance and confidence although this association did not remain significant in the multiple regression analysis (see Appendix 31: A Venn Diagram to **Illustrate** Triangulation of the Integrative Review, Qualitative and Quantitative Findings for Disease-related Factors).

6.5.3 Environmental Characteristics

Of the five environmental characteristics examined in the regression analysis—social support (MSPSS), having family caregivers, having a paid caregiver, participants' opinions on the internet and social media, and receiving clear advice from their doctor or nurse—none of the three environmental factors (social support, having family caregivers, and having a paid caregiver), which have been shown to be significant in other studies, remained independently significant for these Saudi Arabian participants with HF. However, one "other" factor identified in the phase one interviews—reported comfort in asking questions and discussing concerns with a doctor or nurse—was found to be independently statistically significant. In contrast, two other factors identified in the phase one interviews—participants' opinions on the internet and social media and receiving clear advice from their doctor or nurse—were not found to be independently statistically significant.

Participants stressed the importance of being comfortable in discussing their disease with healthcare providers and this was a significant factor in regression analysis, revealing substantial positive associations with self-care management, although it did not correlate with self-care maintenance or self-care confidence. However, health care providers' support, such as clear advice from their doctor or nurse, did not show significant association with self-care maintenance, management or confidence. These findings shed light on an important cultural context among Arab peoples, where most prefer to restrain from disclosing personal matters, preferring not to express physical and psychological complaints that affect their health (Sabry & Vohra, 2013). This was confirmed by the participants in this study regarding their comfort in discussing health problems with their healthcare providers, as well as in their emphasis on the importance of receiving simple and clear medical advice in order to adhere to it in the interview and survey findings. These findings were consistent with those of Clark et al. (2009); Sedlar et al. (2021), where it was revealed that trust and positive beliefs about healthcare professionals and medication reinforced the value of prescribed treatment plans. Moreover, regular access to healthcare services and professional advice was crucial and emerged as barriers to self-care adherence during interviews in the current study. Participants who had routine check-ups and easy access to healthcare providers were better equipped to manage their condition effectively. Easy and affordable access to healthcare services at all times, especially in case of emergency, were factors facilitating self-care among study participants. This was somewhat consistent with findings from Clark et al. (2009), showing self-care linked to several contextual factors, including perceptions of the health system.

However, other environmental characteristics did not remain significantly associated with self-care in multiple regression models, including social support, having family or paid caregivers, or perceived healthcare providers' support, such as receiving clear advice from their doctor or nurse. Social support scored as MSPSS did not show a significant association with self-care maintenance and confidence, which was inconsistent with studies showing patients with HF who had low levels of social support reporting significantly inadequate self-care behaviours (Gallagher et al., 2011; Getachew et al., 2022; Ok & Choi, 2015), lower self-care maintenance (Davis et al., 2015; Lee et al., 2019; Massouh et al., 2020) and lower self-care confidence (Davis et al., 2015; Zhang et al., 2023). Strong family support emerged as an important facilitator. Participants who received emotional and practical support from family members were better

able to adhere their self-care practices. Family involvement in healthcare decisions and daily routines reinforced adherence to self-care practices. Practical support from informal caregivers, such as family or friends, could offer invaluable assistance and encouragement (Sedlar et al., 2021). Both the quantitative and qualitative components of a mixed-method study (Vaughan et al., 2013) found significant bivariate correlations between lower social support and worse self-care maintenance and self-care confidence. Most patients expressed that social support and social norms played a critical role in their daily self-care practices; tangible support from family with self-care maintenance behaviours (e.g., preparing low-salt meals) as well as other daily living activities behaviours was influenced by social norms (Vaughan et al., 2013). Given the cultural context, high social support was expected in this sample, due to the strong family relationships prevalent in Saudi Arabia. In Arab societies, family relations are the most significant social institution (Alkouri et al., 2022; Massouh et al., 2020; Tawalbeh et al., 2017). The role of a family caregiver is rooted in a deep sense of duty and obligation, leading to collective caregiving. Family members often have close ties, exhibit over-protectiveness towards the patient, and frequently switch roles in providing care. Having family caregivers was not significantly associated with self-care maintenance or management; having paid caregivers was not associated with self-care maintenance. However, this was inconsistent with Cocchieri et al. (2015), where having a caregiver was a determinant of inadequate self-care maintenance. Differing cultural patterns and social norms were reflected in inconsistent results regarding domestic social situations examined in eleven studies. Fewer people living with these participants was highly significantly predictive of lower self-care maintenance, self-care management, and self-care confidence in one study conducted in Jordan (Tawalbeh et al., 2017), while having a caregiver was a determinant of only lower self-care maintenance in an Italian study (Cocchieri et al., 2015). Cultural norms that promote collective well-being and supportive friendships also facilitated self-care. Participants benefitted from cultural practices that encouraged healthy living and mutual support. However, choosing to avoid social activities that may exacerbate symptoms was another strategy that some participants found beneficial (Sedlar et al., 2021).

The differing environmental patterns of association observed across these countries likely stem from tangible variations in contextual and cultural factors such as the functioning and dynamics of family relationships and support structures in relation to self-care. These differences

can manifest in various ways, including the extent of intergenerational support, the prevalence of extended family networks, and the cultural norms surrounding caregiving responsibilities. In some countries, strong familial bonds may result in robust support systems (Mutair et al., 2014), where family members actively participate in caregiving duties and provide emotional, practical, and financial assistance to individuals with their health needs. Conversely, in other contexts, societal changes such as urbanisation, migration, and shifting family dynamics may lead to fragmented support networks and increased reliance on formal healthcare services. Understanding these nuances in family relationships and support structures is crucial for developing tailored interventions and policies aimed at improving healthcare outcomes, promoting well-being and improving self-care adherence across patients with HF in diverse cultural and social contexts (Mutair et al., 2014). The current study findings may originate from Saudi culture as the vast majority of participants in this study believed that the presence of family caregivers was inevitable and saw caregiving as part of the family's responsibilities. This was confirmed in the current study, with 64.5% of participants reporting that they did not have or did not need family caregivers and only 2.9% reporting that they needed to hire paid caregivers. While it was not possible to assess need for a caregiver, the mean age of the sample was relatively young (59.9 years). Some participants may have concealed their need for help or care to avoid being a burden on others, or because they were afraid of being judged negatively by their community. This may also have been relevant to their perceptions of social support.

Participants acknowledged the benefits of social media in facilitating self-care. Social media platforms could be helpful in providing access to information and support; participants used social media to learn about their disease, share experiences, and find advice or motivation from others facing similar challenges. However, some noted concerns, such as: not everyone, especially older people, being able to use it; the potential for misuse and resultant errors; and the risk of wasting time. Regarding the internet and social media, opinions varied, with 23.9% considering these things a waste of time, while 28.8% found them helpful for cardiac self-care, and 47.4% just used it for general purposes. Participants' opinions on internet and social media were significantly associated with self-care maintenance, even though this association did not remain significant in the multiple regression analysis. However, participants who did not use the internet and social media tended to have inadequate self-care maintenance. This was partially

consistent with a study that reported the positive effect of networks on HF patients' self-care behaviours (Latifi et al., 2021)

Participants acknowledged external conditions such as adverse weather conditions could limit their ability to attend medical appointments or engage in physical activities necessary for their health. Weather conditions posed a hindrance for certain patients, with both hot and cold weather experienced as deterrents for outdoor exercise, preventing them from venturing out for physical activities. Sedlar et al. (2021) also identified these environmental barriers as seasonal challenges, citing avoiding exercise in winter to prevent flu and concerns about avoiding falls (Sedlar et al., 2021). The existence of facilities promoted participants' self-care practice through encouraging them to be engaged in physical activities. This included, for example, how living close to a park or a walkway could encourage them to be physically active. Easy access to facilities such as parks, gyms, and community centres supported physical activity and other health-promoting behaviours. (see Appendix 31: A Venn Diagram to Illustrate Triangulation of the Integrative Review, Qualitative and Quantitative Findings for Environmental Factors) and (see Appendix 29: Triangulation and Integration of Study Findings)

6.6 Strengths and Limitations of the Study

The strength of this study lies in its use of mixed methods to comprehensively examine how patients with HF perceive and practice self-care, as well as to explore factors associated with self-care in Saudi Arabia. This approach provides a valuable foundation for future research and the development of targeted interventions aimed at improving self-care behaviours among HF patients by offering context-specific insights. Additionally, the application of the theoretical framework, the Situation-Specific Theory of Heart Failure Self-Care, is a significant strength. It deepened the conceptual understanding of self-care among Saudi HF patients and facilitated the exploration of personal, disease-related, and environmental factors that serve as predictors, facilitators, or barriers to self-care adherence. Use of such a widely used theory and associated tool enabled comparison of findings from Saudi Arabia with those from many other countries, both Middle Eastern and other cultures.

Tools used in the study were all well-established and had demonstrated credible psychometric profiles. They had previously been translated into Arabic-language versions using

established valid methods of translation and back-translation and had been used in previous studies with Arabic-speaking populations.

However, several limitations must be acknowledged. The first limitation relates to the recruitment strategy. In assessing self-care behaviours, participants were recruited from a subset of the population that adhered to at least one self-care practice behaviour—that of attending medical appointments in a heart failure clinic. This may have introduced a degree of selection bias, as it excluded individuals who do not engage in regular follow-up care.

In addition, the study participants were recruited from outpatient clinics at a single tertiary referral cardiovascular centre in Aljouf region, using convenience sampling. Consequently, the findings may not be generalisable to patients in different clinical settings and regions. Future studies may replicate this research with more diverse samples of HF patients from various care settings and regions across Saudi Arabia.

Further, data collection for this study was conducted by a single data collector, the research student, who attended the study sites daily throughout the recruitment period. This consistent presence likely ensured that very few individuals declined to participate, thereby strengthening the representativeness of the sample. However, the researcher did not maintain records of the number of patients approached, those assessed as eligible and invited to the study, or those who declined participation. Consequently, information on the response rate is lacking, which affects any claims regarding the representativeness of the study sample.

Furthermore, the method of data collection, which relied on self-reporting for self-care behaviours, may have introduced some bias into the findings. The SCHFI instrument used in the study could have induced socially desirable responses, despite the emphasis on answering questions truthfully and providing privacy to facilitate this. Social desirability bias is a concern, as participants may have deliberately or unintentionally overreported their self-care behaviours.

Also, using self-report for data collection from a population known to experience mild cognitive and/or memory impairment incurs a potential risk for data quality. Additionally, as the SCHFI asks patients to recall their self-care activities over the past 30 days, the self-care management scale was only applicable when participants experienced symptoms such as ankle swelling or dyspnoea during that period. Participants' understanding can also influence the validity of data collected, especially when using self-reported questionnaires (Althubaiti, 2016).

To mitigate this bias, the researcher offered participants the option to have the questionnaires read out for those with low educational attainment, visual impairments, or those who requested this accommodation; subsequently, their responses were recorded.

In terms of data collection tools, the study aimed to utilise high-quality, validated translations whenever available. However, for tools without existing Arabic versions, as well as for the translation of interviews in Phase One, the translations were conducted by the research student who is proficient in both Arabic and English. Some of these translations were subsequently reviewed by another academic who was also competent in both languages. Despite this, the study did not employ a recognised or validated translation method, such as forward-backward translation. This limitation may affect the accuracy and consistency of the translated findings. Future studies should adopt established translation methodologies to ensure the validity of the translated materials.

Additionally, the Situation-Specific Theory of Heart Failure Self-Care questionnaire was updated during the study period. The new version (version 7.2) includes a new concept, “symptom perception,” which measures symptom recognition to align with the theory (Riegel et al., 2016). However, the current study was designed and data for Phase Two were collected between December 2022 and July 2023, before SCHFI version 7.2 was published. Besides, there was no validated Arabic version available for the new version. Although the Mini-Cog was used for cognitive assessment as a screening tool because it has minimal language content, which decreases potential cultural and educational bias, its reliance on clock drawing, which most illiterate participants struggled with, may have introduced some bias. Illiteracy among participants may have led to errors in some self-care indicator responses, but it is unlikely that this significantly affected the study's major findings.

The internal consistency of scales used in the current study was generally acceptable among the sample, except for SCHFI, DHFKS, and MSPSS. The SCHFI had low Cronbach alpha values of 0.551 and 0.511 for self-care maintenance and self-care management subscales respectively. The Cronbach alpha for self-care confidence was 0.789, which is considered satisfactory. However, these values are notably lower than those reported in an Arabic version of the SCHFI among a Lebanese sample by Deek et al. (2016), which found values of 0.87, 0.97, and 0.97 for self-care maintenance, management, and confidence, respectively. The use of the SCHFI for Arabic populations should be reviewed with other populations than the Lebanese peoples used by Deek

et al. (2016). A future formal validation study with a sample from Saudi Arabia is recommended ahead of its repeat use with this population. Additionally, the Cronbach alpha for the DHFKS scale was 0.347, and for the MSPSS friend subscale, it was 0.682. These results suggest that future research should consider conducting an exploratory factor analysis to further examine the factor structure of these tools in another Saudi HF sample.

Finally, in this study, the model explained 21%, 14%, and 23% of the variance in self-care maintenance, self-care management, and self-care confidence, respectively. This means that 79%, 86%, and 77% of the variance in self-care adherence remains unexplained, indicating that other unknown factors may influence self-care adherence among participants. This once again flags the importance of using locally tailored tools to investigate local populations, to produce context-specific data to inform policy and practice development. Despite these limitations, the findings of this study contribute to the existing body of evidence by identifying factors that affect self-care behaviours, and these data will be able to be used to guide and inform development of future studies and interventions aimed at improving self-care in HF patients and their families.

Chapter Seven: Conclusions, Study Implications and Recommendations

7.1 Introduction

This chapter presents the conclusion of this thesis, along with the implications of the findings and consequent recommendations for future nursing practice, policy development, education and research.

7.2 Conclusion

This mixed-method study first conducted an integrative review of the literature to demonstrate what was currently known about factors that have been demonstrated as determinants or predictors of self-care adherence in patients living with heart failure. This review identified several key issues. Firstly, with published literature coming from many different countries and cultures, many different patterns of various significant factors were identified and findings from different populations were often inconsistent. Factors of significance for one population were often insignificant for others. This suggested that cultural factors unique to each study population have a significant influence on how patients live with heart failure, and flagged

the importance of obtaining local data to inform and support local service development. Secondly, with only one study originating from Saudi Arabia (in a different location to the thesis study site), Saudi Arabian patterns of self-care adherence for heart failure patients were largely under-explored; this is an important gap locally and for the Arabic knowledge base more generally. This finding confirmed the significance of the study topic.

This thesis study then comprehensively examined how patients with HF perceive and practice self-care, and explored factors associated with self-care in Saudi Arabia. It highlighted the significant impact of HF for multiple aspects of patients' daily lives, including their physical, social, psychological, spiritual, and employment status. The study provided evidence of overall inadequate self-care maintenance, management, and confidence among participants with HF. This approach offers a valuable baseline for future research aimed at improving self-care behaviours among patients with HF by providing context and culturally specific insights.

The use of a mixed-method research design facilitated the integration and triangulation of findings, offering a more comprehensive understanding of Saudi HF patients. This approach provided valuable insights into the characteristics of patients with HF, the impact of the disease on various aspects of their lives, their self-care practices (including strengths and deficits), perceptions of self-care, HF knowledge, and the influence of numerous personal, disease-related and environmental factors on their self-care practices.

Participants reported engaging in various self-care practices, such as adhering to their medication regimen, attending doctor or nurse appointments, following a low-salt diet, and participating in physical activities. However, many acknowledged that they struggled to maintain these practices. Additionally, practices such as checking for ankle swelling, requesting low-salt options when dining out or visiting others, restricting fluid intake and avoiding illness (e.g., getting a flu vaccination and steering clear of sick individuals) were not reported by participants as part of their HF self-care during the interviews. Nevertheless, participants highlighted other important self-care practices during the interviews, including seeking information, achieving a balance between work and rest, quitting smoking, establishing a good sleep routine and managing stress.

The use of an established theoretical framework, the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2022), enhanced the conceptual understanding of self-care in

patients with HF and facilitated the exploration of factors that independently predict, facilitate or are barriers to self-care adherence. Combined with findings from the Phase One interviews, several personal, disease-related, and environmental characteristics were identified as significant predictors of self-care maintenance, self-care management, and self-care confidence among the participants. Based on the study findings, more attention is needed for patients with HF who are least likely to engage in self-care, such as those who are physically inactive, employed, newly diagnosed with HF, have frequent hospital admissions, lower (less severe) NYHA classes, are prescribed higher numbers of medications, and those who do not feel comfortable discussing their disease with healthcare professionals. Specifically, as a personal factor, physical activity was an independent significant predictor of inadequate self-care maintenance. This indicates that a Saudi patient with HF who is not engaged in physical activity is more likely to neglect other self-care practices as well. Therefore, healthcare providers should ask their patients with HF about their level of engagement in physical activities to understand their overall level of self-care practice and identify the need for further support. Also, employment was a significant independent predictor of poorer self-care confidence. Therefore, it is recommended that employed patients with HF receive motivational counselling to help them structure their work-life balance in a way that allows sufficient time for HF self-care and attending to their healthcare needs (Dickson et al., 2011).

Additionally, patients who were newly diagnosed with HF (had shorter duration with HF) and were classified at lower (less severe) NYHA class were independently significantly more likely to report inadequate self-care management. These findings suggest that patients who are newly diagnosed with HF may lack the knowledge and skills to correctly interpret their symptoms and take appropriate actions to improve their condition in a timely manner to prevent HF exacerbation, hospitalisation, and further complications. Patients with a lower NYHA class may not fully appreciate the seriousness of their condition and the necessity for engaging in self-care practices. Therefore, healthcare providers should dedicate time with these patients to ensure they have a reasonable perception of their health condition and the associated risks (Gholizadeh et al., 2010) and are equipped with the necessary knowledge and skills to self-manage their condition effectively. Other significant disease-related predictors of inadequate self-care practices included frequent hospital admissions due to HF, which are likely to be a reflection of the severity of their HF condition (Lahoz et al., 2020). It is likely that patients with more frequent

hospitalisations may be less confident in the effectiveness of self-care practices or feel uncertain about their ability to improve their condition through self-care behaviours (Sahlin et al., 2022). Therefore, these patients should be specifically targeted by healthcare providers to receive adequate support and encouragement regarding self-care practices (Guo et al., 2023). Finally, in this category, the number of medications taken daily was a significant predictor of inadequate self-care practices. This suggests that patients managing multiple medications may struggle with self-care adherence, highlighting the need for targeted support and interventions from healthcare providers (Ruppar et al., 2016).

As an environmental factor, feeling uncomfortable discussing their health issues with healthcare providers was identified as a significant independent predictor of inadequate self-care. This finding has important implications for healthcare providers, emphasising the need to create a supportive and open environment that encourages patients to communicate freely about their health concerns. It is likely that low health literacy may affect communication between patients and their healthcare providers (Alahmadi, 2023), leading ultimately to inadequate self-care practices (Erüna & Mert, 2020). Other studies have indicated that improved health literacy has an important role in increasing patient empowerment (Palumbo, 2017). For patient empowerment, patient-centred educational programs and patient advocacy groups are essential to foster effective relationships between patients and healthcare providers. This should enable patients to more effectively communicate their needs and concerns to their healthcare providers, helping them to set clear goals (Clochesy et al., 2015). In addition, the presence of advocacy groups can facilitate this communication, leading to more personalised and effective care (Kreps, 2021).

Although the current study identified significant predictors of self-care adherence among a sample of Saudi patients, a high percentage of variance remained unexplained for each of the SCHFI self-care maintenance, management and confidence models. To facilitate improvements in self-care, further research is needed to identify other unknown factors or variables that can influence and explain self-care adherence among Saudi patients. Moreover, with only six of 22 variables (plus one 'other' factor) shown to be independently significant, the pattern of significance found in the current study does not entirely align with the literature from other countries, underscoring the importance of local data. The characteristics of the country where this study was based, in terms of population characteristics, culture, and the healthcare system,

differ from the origin and principal usage of the theory that guided this study (Riegel et al., 2022). Although widely used, the Situation-Specific Theory of Heart Failure Self-Care (in its current form at least), might not be as relevant to Middle Eastern populations due to its origins in Western cultures. This underscores the importance of local information and the need for more qualitative research to collect context-specific data. While some factors identified in the literature review were also significant in the current study, other factors that were frequently significant in the literature were not found to be so in the thesis study. Conversely, several factors emerging as significant from the interviews did not appear in the theory. These cultural factors are crucial when designing future research or developing interventions aimed at improving the self-care practices of HF patients in Saudi Arabia.

Self-care is perceived differently across cultures, with cultural beliefs, social norms, and attitudes playing a crucial role in influencing outcomes related to self-care (Osokpo et al., 2019). Traditional patient education may not always be effective in helping patients with HF and their families, including caregivers, develop essential self-care skills (Veneri & Zdanis, 2018). To improve adherence to self-care, patient education and interventions must be tailored to integrate cultural aspects and individual needs into healthcare providers' guidance (Stubbe, 2020). A lack of culturally acceptable interventions can hinder the adoption of self-care behaviours, particularly when there is a perceived misalignment with cultural beliefs (Stubbe, 2020). Healthcare providers must consider factors such as spirituality, social norms, and cultural food practices and preferences when providing HF care (Latif, 2020). It is also important to assess social support that extends beyond tangible resources, such as emotional support and companionship to help improve self-care (Drageset, 2021). Thus, as HF prevalence rises globally, it will be increasingly critical to prioritise research that develops and tests culturally sensitive interventions (Castro et al., 2010).

7.3 Study Implications and Recommendations

The global prevalence of HF is increasing, placing significant strain on populations worldwide in terms of morbidity (Luyckx et al., 2018; Metra & Teerlink, 2017), mortality (Dokainish et al., 2017; Lippi & Sanchis-Gomar, 2020) and financial costs (Shafie et al., 2018; Urbich et al., 2020). Consequently, the development and implementation of effective health strategies to improve the health and self-care of individuals in Saudi Arabia living with HF is of paramount importance

(AlHabeeb et al., 2019). The findings of this study highlight essential implications and offer recommendations for nursing practice, education, policy, and research. These insights are aimed at enhancing the quality of care, improving self-care outcomes, and guiding future nursing research initiatives.

7.3.1 Implications for Nursing Practice

Nursing practice plays a critical role in supporting self-care adherence by fostering effective relationships with patients, conducting regular assessments of self-care behaviours, and providing ongoing guidance and encouragement. The current study highlighted the importance of thorough patient assessments to identify those at risk for inadequate self-care.

A better understanding of the factors affecting self-care behaviours in Saudi patients allows for more personalised and appropriate care (Kleman et al., 2024). The study's findings showed personal, disease-related, and environmental factors that significantly affect self-care adherence among patients with HF. More attention is needed for patients with HF who are least likely to engage with self-care, such as those who are physically inactive, employed, have shorter duration of HF, more hospital admissions, lower NYHA classes or severity, higher numbers of medications, and those who do not feel comfortable discussing their disease with healthcare professionals. To effectively address self-care practices in patients with HF, healthcare providers need to understand these factors, as well as the facilitators and barriers to self-care, to promote self-care in HF patients and their caregivers (Kleman et al., 2024).

The findings of the current study presented in this thesis highlight the importance of regular assessments and support of any physical, psychological or social issues that may affect self-care behaviours. Study findings indicated that impacts on confidence and self-esteem may lead to reduced social and physical activity, highlighting the importance of holistic care approaches. Interventions should not only address the physical symptoms of HF but also support patients in maintaining their social roles and activities (Olano-Lizarraga et al., 2022). In addition, interventions to improve self-care adherence should include strategies to mitigate fatalistic views (Thapa et al., 2024). Self-care management interventions should focus on promoting confidence (Castillo-Mayén et al., 2020) or increasing perceptions of perceived agency to decrease fatalism (Thapa et al., 2024) and improve engagement in self-care (Dineen-Griffin et al., 2019).

Concerns about being a burden to others and the impact on family well-being suggest that HF affects not just the patients but also their families. Family-centred care approaches and support systems could therefore be beneficial (Chartrand et al., 2023; Deek, 2015). High levels of social support from family members, as indicated by the MSPSS scores, highlight the crucial role of family in patients' care and emotional well-being. Engaging family and friends in patient care and educating them can enable better use of these resources to enhance patient self-care for HF (Chartrand et al., 2023; Deek, 2015). Tailoring exercise programs that incorporate group activities and/or social support may improve adherence to physical activity (Burke et al., 2006; Gary et al., 2020; Zores et al., 2019) and overall self-care in HF management by aligning with cultural values and preferences (Rio & Saligan, 2023).

The study highlights the complexity of self-care in patients with HF, emphasising the need to assess whether frequent or regular follow-up visits are required to support them in maintaining health, such as daily exercise and restricting fluid and salt, facilitating behaviour changes, managing comorbid conditions, improving medication adherence, detecting early signs of deterioration, and encouraging symptom management (Cunha et al., 2021; Pobrotyn et al., 2021). Tailored follow-up can help identify deficiencies in self-care, allowing for timely interventions in care plans (Dineen-Griffin et al., 2019). Additionally, ongoing encouragement and guidance from nurses can enhance patients' confidence in undertaking self-care behaviours (Hashimoto et al., 2023).

Nurse-led heart failure specialist clinics—offering services such as educational counselling, evidence-based transitional care, psychosocial support, physical examinations, mental health assessments, treatment monitoring and modification, follow-up, and phone consultations—play a pivotal role in patient care (Wu et al., 2024). These services, including education, training, and behaviour change support strategies, must be tailored to meet the unique needs of individual patients and communities, underscoring the importance of detailed assessments (Wu et al., 2024). Combined with enhanced training for heart failure nurse practitioners, these clinics help optimize treatment, improve medication titration efficacy, reduce hospital readmissions, enhance quality of life, and support the long-term management of heart failure (Wu et al., 2024).

Key recommendations:

- o Foster therapeutic nurse–patient relationships: Nurses should establish consistent, empathetic communication by actively engaging patients in conversations about their

health status and care plans. Simplifying complex medical information and using individually tailored educational methods such as visual aids or teach-back methods can help overcome language or health literacy barriers, thereby improving patients' understanding and engagement in self-care.

- o Enhance patient education with tailored content: Develop structured, culturally sensitive educational programs that address disease understanding, symptom recognition, medication management, dietary modifications, and physical activity. Education should be adapted to patients' cognitive levels, learning preferences, and socio-cultural backgrounds.
- o Incorporate tailored education, training and behaviour change approaches and strategies that make use of assessment data to optimise patients' self-care. Such strategies might include motivational interviewing techniques to address ambivalence and strengthen patients' intrinsic motivation for adopting and maintaining self-care behaviours.; incorporation of behaviour change models such as the Health Belief Model or COM-B to guide personalised interventions.
- o Where appropriate, digital health tools may be used for monitoring and support. These might include mobile health apps, SMS reminders, or remote monitoring devices to support daily self-care activities, such as weight monitoring, medication adherence, and symptom tracking. It will be important to ensure that any digital solutions are accessible and user-friendly for older adults.
- o Findings demonstrate the importance of facilitating access to self-monitoring equipment. Services could consider providing subsidised or free access to essential monitoring tools (e.g., blood pressure monitors, weighing scales) for patients with financial constraints to support daily tracking of HF symptoms.
- o Given the importance of family and caregiver involvement, the engagement of family members or informal caregivers in care planning and training sessions should be encouraged and facilitated. Findings indicated the importance that these supporters were equipped with knowledge and strategies to support patients' adherence to lifestyle changes, medication regimens, and symptom management.
- o Findings indicate the importance of addressing psychosocial and emotional well-being. Psychological assessments should be integrated into care routines and repeated as

necessary to identify depression, anxiety, or social isolation. Referrals should be available to counselling services, peer support groups, or community resources when needed.

- Findings support design of culturally appropriate group exercise and education programs. Services should offer group-based exercise programs that integrate cultural norms and social interaction, such as walking groups or culturally relevant physical activities. Group education sessions can also promote social support and shared learning.
- Interventions should be designed that actively promote self-efficacy, such as goal setting and tracking achievements. Any fatalistic health beliefs should be challenged through culturally sensitive dialogue and empowerment strategies.
- Structured and frequent follow-up should be available, according to need. Care pathways should be enabled that include regular in-person or virtual follow-up visits to reinforce self-care behaviours, adjust treatment plans, and provide ongoing motivation, with checklists or care plans to assess self-care adherence and detect early signs of deterioration.
- Nurse-led heart failure care services should be strengthened and expanded, investing in the training, certification, and professional development of heart failure nurse practitioners. These clinics should be empowered to provide comprehensive patient education, routine clinical monitoring, and individualized support to promote effective self-care among patients with heart failure.

7.3.2 Implications for Nursing Education

The study findings highlight the critical need to incorporate models of chronic care into the curricula of health-related courses, particularly in nursing education (Flaubert et al., 2021). As chronic diseases including heart failure continue to rise globally, nursing professionals are increasingly required to manage long-term conditions effectively (Duprez et al., 2017; Owens et al., 2017). When educating nursing students about self-care management for chronic diseases, it is essential to provide a holistic approach that integrates both theoretical knowledge and practical skills (Slemon et al., 2021). Students should be introduced to the concept of chronic disease by explaining its burden and the significant role of self-care in its management (Slemon et al., 2021). Their education should highlight the critical role that nurses play in supporting

patients through education, counselling and consistent monitoring (Flaubert et al., 2021). The core components of self-care management should form the foundation of the teaching (Foster et al., 2014). Nursing students should understand the importance of self-monitoring, where patients track vital signs like blood pressure, blood sugar levels and weight to detect early signs of deterioration (Brekke et al., 2019). Medication adherence is equally critical, and students should learn strategies to help patients follow prescribed treatments (Witry et al., 2017). Educating patients about diet and nutrition is another vital aspect, as dietary choices can have a significant impact on chronic disease outcomes (Witry et al., 2017). Nurses should also promote physical activity as part of a healthy lifestyle and educate patients on how to recognise and respond to symptoms that indicate their condition may be worsening (Malik et al., 2023). Encouraging lifestyle modifications, such as smoking cessation and limiting alcohol intake, also plays a significant role in effective disease management (Souza Carneiro et al., 2016).

Communication skills, patient education and counselling techniques are fundamental in promoting self-care for chronic conditions such as HF (Kerr et al., 2022). Nurses must provide culturally sensitive care, taking into account the diverse backgrounds and beliefs of their patients (Stubbe, 2020). This is particularly important in regions like Saudi Arabia, where cultural values heavily influence healthcare behaviours (Albalawi et al., 2020). Teaching students motivational interviewing techniques can enhance their ability to engage patients in discussions about behaviour change and adherence to self-care practices (Bischof et al., 2021; Dickson et al., 2011). Additionally, students should be trained in collaborative goal setting, working with patients to create achievable health goals (Clochesy et al., 2015; Puczynski et al., 2005). Empowering patients to take control of their health decisions fosters greater adherence to self-care plans (Rasmusson et al., 2015).

It is also important to address the psychological and psychosomatic aspects of self-care (Malik et al., 2023). Many patients with chronic diseases experience emotional challenges such as anxiety and depression, which can hinder their ability to follow self-care regimens (Nordfonn et al., 2019). Teaching students to recognise and address these emotional barriers will help them provide holistic care (Nordfonn et al., 2019). Furthermore, the role of family and caregivers should not be overlooked, as they are often essential in supporting patients with chronic illnesses (Chartrand et al., 2023).

Chronic care models and frameworks, such as the chronic care model, provide a structured approach to managing long-term conditions (Grover & Joshi, 2015). These models emphasise the importance of multidisciplinary collaboration and continuity of care (Bell et al., 2022). Students should be familiarised with these frameworks to understand how they can guide healthcare professionals in delivering coordinated care that meets the complex needs of chronic disease patients (Grover & Joshi, 2015).

Technology also plays an increasingly important role in self-care management (Peeters et al., 2013). Health technologies, such as mobile health apps and telehealth platforms, allow patients to monitor their health and communicate with healthcare providers more efficiently (Peeters et al., 2013). It is important for students to learn how to guide patients in using these tools to enhance their self-care practices (Britnell et al., 2014). Additionally, students should be trained to assess patient adherence to self-care plans, using tools and methods that measure progress and adjust care plans as needed (Ardi et al., 2023; Franklin et al., 2015). Ongoing assessment ensures that patients remain engaged in their self-care and that interventions are tailored to their evolving needs (Dineen-Griffin et al., 2019; Franklin et al., 2015).

To reinforce these concepts, diverse educational approaches and strategies, such as case studies and simulation exercises, can be used to enhance learning and provide students with opportunities to apply their knowledge in real-world scenarios (Khalil et al., 2023). By engaging with practical examples, students can develop the problem-solving and decision-making skills necessary to manage chronic diseases effectively (Dineen-Griffin et al., 2019). Incorporating these elements into nursing education will prepare students to take on the challenges of chronic disease management and equip them with the tools to improve patient outcomes (Flaubert et al., 2021).

Key recommendations:

Nursing programs, continuing education and professional development for practising nurses should include education on self-care behaviours in HF management, focusing on local data on knowledge deficits, health literacy and sociocultural factors in Saudi Arabia and other Middle Eastern countries.

- Nursing curricula and continuing education for practising nurses should prepare nurses to provide effective care for patients with chronic conditions such as HF. This includes incorporating patient care models that focus on chronic disease management and self-

care practices. Key concepts should cover symptom monitoring, symptom recognition, symptom management, patient empowerment, health literacy, counselling methods such as motivational interviewing, and regular follow-ups with healthcare professionals.

- Nursing curricula and continuing education for practising nurses should introduce emerging self-management tools, such as mobile health apps and telehealth, to help engage HF patients in self-care practices.
- Nurses should be trained to deliver self-care education in culturally appropriate ways.
- Nurse-patient communication skills should be fostered through actively engaging patients in conversations about their health and focusing on simplifying health information and considering language barriers or health literacy levels.

7.3.3 Implications for Nursing Policy

The study underscores the necessity of utilising context-specific information in managing HF patients (Elendu et al., 2024; Skouri et al., 2024). Current reliance on global standardised protocols or guidelines may be problematic, as they often assume that factors significant in other regions are equally relevant in Saudi Arabia, which may not be the case. The study highlights the importance of developing nursing policies that support the development and implementation of evidence-based self-care interventions, essential for creating effective nursing care plans for HF patients in this country (AlHabeeb et al., 2019). Effective policies at both national and institutional levels are crucial to ensure effective education and support for self-care, ultimately enhancing quality of life, reducing hospital readmissions and lowering economic costs for individuals, families, and society (Son et al., 2020).

Furthermore, nursing policies in Saudi Arabia should prioritise the availability of information in Arabic for patients with HF to improve their health literacy, an important factor in self-care practice (Alshareef et al., 2018). Additionally, culturally and linguistically competent healthcare providers should be available to ensure effective therapeutic relationships and communication between the patient and providers, particularly for management of chronic disease such as HF (Pettersson et al., 2023). Unfortunately, the current reliance of the healthcare system on foreign health professionals poses a barrier to achieving this goal (Hamadi et al., 2024).

The findings highlight the need for supportive measures to help patients manage their condition while maintaining their livelihoods. The significant reduction in employment rates among the participants in this study highlights the need for workplace practices that enable patients with HF or other chronic conditions to continue working, and flexible job roles to cater to these patients' health needs (Dickson et al., 2011). Cognitive and physical challenges, such as fatigue, lack of concentration and activity intolerance, suggest that employers and healthcare providers should collaborate to create supportive work environments for patients with HF (Suutari et al., 2021). This could include offering part-time positions, remote work options, or less physically demanding tasks. Healthcare providers should consider the employment status and work-related challenges of HF patients when designing treatment plans (Dickson et al., 2011). Additionally, policymakers should advocate for policies that protect the employment rights of individuals with chronic conditions, ensuring they have access to necessary accommodation and support (Bosma et al., 2021).

Key Recommendations:

- Considering the significant burden of HF among Saudi population, nationwide campaigns should be implemented to enhance the general population's understanding of HF and the importance of self-care. These initiatives should target various population segments through accessible media and community outreach programs.
- In the light of the lack of local guidelines, national guidelines should be developed for HF management that consider local patient characteristics, cultural contexts, workforce and resources. These guidelines should prioritise self-care education as an integral part of routine care for HF patients.
- Policymakers should advocate for policies that protect the employment rights of individuals with HF. They should collaborate with healthcare professionals to ensure that patients with HF have access to necessary support.
- Considering the inadequate level of self-care practice among the study participants, emerging effective patient education and counselling tools such as telemedicine and eHealth initiatives should be embraced to enable monitoring of these patients' adherence to self-care practices and to provide education and support as needed, particularly for those in rural areas.

7.3.4 Implications for Nursing Research

The findings of this study contribute to the growing body of research on self-care in HF patients and highlight the need for further investigation into the factors affecting self-care adherence, particularly in Saudi Arabia and other under-researched locations. Firstly, as study participants were recruited from outpatient clinics at a single tertiary referral cardiovascular centre using convenience sampling, findings may not be generalisable to patients in other clinical settings and regions. Secondly, the high percentage of unexplained variance for each SCHFI component- self-care maintenance, management, and confidence in the literature and particularly in this study indicates the need for further research in this area, both globally and in Saudi Arabia. This research should aim to identify those currently unrecognised factors that could influence and explain self-care adherence in diverse populations and settings.

Another key contribution of this research is its evaluation of the relevance of the Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2022) when applied to an Arabic population. The pattern of significant factors identified in this study diverges from those expected, based on literature reviews conducted in other countries. While some factors are consistently highlighted as important for self-care adherence in various studies, they did not consistently emerge as significant in this context. This highlights the critical need for context-specific data.

Future research should investigate the psychometric properties of the newly published version of the self-care of heart failure index (SCHFI-v2) to ensure its validity and applicability for use with Saudi Arabian patients with HF.

Significant conceptual work remains necessary to fully understand HF self-care, particularly since this study showed some gaps and deficits in the widely recognised Situation-Specific Theory of Heart Failure Self-Care (Riegel et al., 2022) in relation to its fit to Saudi populations, and possibly other such highly collectivist cultures (Leong et al., 2022). Further research is required to explore the most effective forms, content, and delivery methods of self-care education, to ensure they align with patient needs and available nursing and health service resources (Dineen-Griffin et al., 2019). More qualitative and mixed-methods studies are needed to deepen understanding of the beliefs, values, and societal norms that shape self-care perceptions and behaviours (Bazen et al., 2021; Wasti et al., 2022) in the Saudi context.

This research will be essential in developing interventions that best support self-care for patients living with HF in Saudi Arabia and possibly other Middle Eastern countries. Health services research methods should focus on developing and testing culturally congruent interventions designed to improve self-care adherence (Osokpo & Riegel, 2021). It is also necessary to investigate what support systems and interventions are required to implement and sustain these changes in nursing practice (Dagne & Beshah, 2021).

Further, attention must be given to identifying the best approaches for ensuring the nursing workforce is prepared and supported to fulfill roles in developing and delivering research to support patient self-care service development and evaluation (Flaubert et al., 2021). This comprehensive approach will be critical in improving heart failure self-care management across the region.

Key recommendations:

- Further research is needed to replicate this research with a more diverse sample of patients with HF from different care settings and regions across Saudi Arabia.
- Further research is needed to identify unknown factors or variables that influence self-care adherence among patients with HF in Saudi Arabia and globally. This includes exploring diverse populations and settings to understand the variance in self-care maintenance, management, and confidence.
- Assess the relevance of existing theories such as the Situation-Specific Theory of Heart Failure Self-Care when applied to Arabic populations. This involves examining how cultural contexts influence self-care adherence and identifying region-specific factors.
- The psychometric properties of the newly published version of the self-care of heart failure index (SCHFI-v2) should be tested to ensure its validity and applicability for Saudi Arabian patients. This may include refining and validating other tools to assess self-care across different cultural contexts.
- Research is needed to identify the most effective forms, content, and delivery methods of self-care education. Ensure these methods align with patient needs and available nursing and health service resources in Saudi Arabia and other Middle Eastern contexts.
- More qualitative and mixed-methods studies are needed to deepen the understanding of beliefs, values, and societal norms that shape self-care perceptions and behaviours in the Saudi context, to help in designing culturally appropriate interventions.

- Health services research techniques should be used to develop and test interventions designed to improve self-care adherence, creating tailored interventions that address the specific needs and cultural contexts of Saudi HF patients.

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Appendices

Appendix 1: Example of the Search Strategy Applied in one Database (MEDLINE)

Print Search History: EBSCOhost

13/3/2024, 2:08 pm



#	Query	Limiters/Expanders	Last Run Via	Results
S15	S11 AND S12 AND S13	Limiters - Publication Date: 20091101-20240331; English Language; Human Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	793
S14	S11 AND S12 AND S13	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,192
S13	S5 OR S6 OR S7 OR S8 OR S9 OR S10	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,379,788
S12	S3 OR S4	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	72,997
S11	S1 OR S2	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	50,056
S10	""influence""	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	259,633
S9	""barrier*""	Expanders - Apply	Interface - EBSCOhost	124,825

<https://web-p-ebscobhost-com.ezproxy.lib.uts.edu.au/ehost/sear...VN0YW5kYXJkLnNpdGU9ZWwhvc3QtYGl2ZQ%3d%3d&theSearchHistoryId=>

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Appendix 2: The Details of MMAT (Hong et al., 2018) Critical Appraisal Scores

Author & year	Screening question		1. Qualitative					3. Quantitative non-randomised					4. Quantitative descriptive					5. Mixed methods					Score
	S1	S2	1.1	1.2	1.3	1.4	1.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	5.1	5.2	5.3	5.4	5.5	
Liu et al. 2014	Yes												can't tell	can't tell	No	can't tell	Yes						**
Gallagher et al. 2011	Yes	Yes											can't tell	can't tell		can't tell	Yes						*
Cocchier et al. 2015	Yes	Yes											can't tell	can't tell	Yes	can't tell	Yes						**
Clark et al. 2009	Yes	Yes	Yes	Yes	can't tell	can't tell	Yes																***
Cameron et al. 2009	Yes	Yes											Yes	Yes	Yes	Yes	Yes						*****

Peters- Klimm et al. 2013	Ok et al. 2015	Muller- Tasch et al. 2018	Lee et al. 2019	Kato et al. 2009	Graven et al. 2019	Davis et al. 2015
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
can't tell	Yes	Yes	Yes	Yes	Yes	Yes
can't tell	Yes	Yes	can't tell	Yes	can't tell	can't tell
Yes	Yes	Yes	Yes	Yes	Yes	Yes
can't tell	Yes	Yes	can't tell	can't tell	can't tell	yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
**	*****	*****	***	****	***	****

Al-Hammouri et al., 2020	Vaughan et al. 2013	Uchmanowicz et al. 2017	Tung et al. 2012	Tawalbeh et al. 2017	Son et al. 2018	Siabani et al. 2016
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
						Yes
						Yes
						Yes
						can't tell
						Yes
		Yes	can't tell	can't tell	can't tell	
		can't tell	Yes	can't tell	can't tell	
		Yes	Yes	Yes	can't tell	
		can't tell	can't tell	Yes	Yes	
		Yes	Yes	Yes	Yes	
Yes	No					
can't tell	Yes					
Yes	Yes					
can't tell	can't tell					
Yes	can't tell					
***	**	***	***	***	**	****

Zhang et al., 2023	Sedlar et al., 2021	Massouh et al., 2020	Gomes da Silva et al., 2023	Getachew et al., 2022	Alkouri et al., 2022	Aljohani et al., 2023
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
can'	Yes	can'	can'	Yes	can'	can'
Yes	Yes	Yes	Yes	Yes	Yes	can'
can'	Yes	can'	can'	can'	Yes	can'
Yes	Yes	Yes	Yes	Yes	Yes	can'
***	*****	***	***	****	****	*

S1: Are there clear research questions?

S2: Do the collected data allow to address the research questions?

1.1: Is the qualitative approach appropriate to answer the research question?

1.2: Are the qualitative data collection methods adequate to address the research question?

1.3: Are the findings adequately derived from the data?

1.4: Is the interpretation of results sufficiently substantiated by data?

1.5: Is there coherence between qualitative data sources, collection, analysis and interpretation?

3.1: Are the participants representative of the target population?

3.2: Are measurements appropriate regarding both the outcome and intervention (or exposure)?

3.3: Are there complete outcome data?

3.4: Are the confounders accounted for in the design and analysis?

3.5: During the study period, is the intervention administered (or exposure occurred) as intended?

4.1: Is the sampling strategy relevant to address the research question?

4.2: Is the sample representative of the target population?

4.3: Are the measurements appropriate?

4.4: Is the risk of nonresponse bias low?

4.5: Is the statistical analysis appropriate to answer the research question?

- 5.1: Is there an adequate rationale for using a mixed method design to address the research question?
- 5.2: Are the different components of the study effectively integrated to answer the research question?
- 5.3: Are the outputs of the integration of qualitative and quantitative components adequately interpreted?
- 5.4: Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?
- 5.5: Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?

Appendix 3: Permission to Use Figure 1 Depicting the Interaction Between Person, Problem and Environment Characteristics in a Published Journal

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Licensed Content Title	The Situation-Specific Theory of Heart Failure Self-care: An Update on the Problem, Person, and Environmental Factors Influencing Heart Failure Self-care
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Appendix 4: Interview Schedule Questions

<u>Guiding Questions</u>	<u>Possible Prompts / Follow-Up Questions</u> (if that does not come up to prompt it)
<ul style="list-style-type: none"> • Please can you describe your typical day? • Can you tell me about what you do on a daily basis to look after your heart health? • What do you usually do to help manage your heart failure? • What changes, if any, have you made in your life in order to manage your heart failure? • Have there been any changes that you feel you should have made, but have not been able to? What are these? What made it difficult or stopped you making changes to your lifestyle? 	<ul style="list-style-type: none"> • Tell me what you do every day from when you wake up in the morning till you go to bed. • What is your usual diet? How it has been affected by your heart failure and the treatment recommended to you? What about your food choices in meals, is there anything you need to do for heart failure that you would not do before? How has your life changed since the diagnosis of your disease? (If no response, ask probing questions - Any change in your job, physical activity....)
	<ul style="list-style-type: none"> • How often do you weigh yourself? At the same time of day? Did you have a scale and weigh yourself regularly before your heart failure? If you weigh yourself, how does your weight affect your lifestyle?
	<ul style="list-style-type: none"> • Do you smoke? How do you feel about your smoking? Have you ever tried to quit? How has this been affected by your heart failure? How did you try quitting smoking? i.e replacing with nicotine therapy?
	<ul style="list-style-type: none"> • Do you take regular physical activity? What do you do? How often do you do this? Do you exercise hard enough to make you breathe hard? Or get out of breath? Can you still talk while you exercise? How long do you walk? How many minutes or hours? How has your regular exercise been affected by your heart failure?

	<ul style="list-style-type: none"> • What medicines are you taking? Are any of these new prescriptions since your heart failure? Do you take them exactly as prescribed? Have you experienced any side effects or problems with your medicines? Is it easy to get repeat prescriptions and get them filled? On time? Do you ever miss doses? If so, what happens to make you miss doses or stop taking them? Is there anything that helps you or makes it more difficult for you to stick to taking your medicines as prescribed?
<ul style="list-style-type: none"> • What things help you look after your heart health? • What things make it difficult for you to look after your heart health? 	<ul style="list-style-type: none"> • Thinking about the things that you have said you do to look after your heart health, is there anything that you feel is helpful for you in looking after your heart health? For example, has anyone helped you? Taught you about your heart health? Given you any tips or tricks about looking after yourself? For example, given you advice about your diet / about exercising/ stopping smoking / managing your medicines? Is there anything that you feel makes it harder for you in looking after your heart health? • Is there anything about your disease itself that makes it easier or harder to look after your heart health? • Is there anything or anyone in your everyday life that makes it easier or harder to look after your heart health? Any family, friends or neighbours? Any clubs, mosque or other support groups? • Does your religion affect your health and how you look after yourself? If yes, how does this work? • Does our culture affect your health and how you look after yourself? If yes, how does this work?

	<ul style="list-style-type: none"> • What symptoms do you watch for to make sure that your disease is under control or has not been worsening? • What do you do if you see swelling in your feet?
Thank you for taking the time to tell me about your heart failure and how it affects your life. Is there anything else you think I should know?	

Thank you for agreeing to speak with me today. My name is Hamdah Alshammari, and I am a research student at University of Technology Sydney, Australia. My study aims to find out about self-care in patients with heart conditions and to identify the factors that help or hinder people in taking care of their heart health.

You are being invited to take part in this research project because you have been attending a cardiac clinic at the hospital. We would like to know your experience of heart disease and how you take care of yourself and your heart health: how you regard self-care and what you do in relation to your heart condition and what that means to you; what cultural beliefs and values shape your self-care practices and what helps or hinders you in your self-care. We are interviewing around twenty to thirty patients. The interview should take approximately 30 to 45 minutes.

With your permission, we'd like to audio-record the conversation, as this allows me to make sure I don't miss anything you say. This will be written up later. All interviews are confidential and no one at the hospital will know if you participated in this research or not, or what you said. Whether you participate or not, it will not affect the care you receive. If you agree to participate, but then change your mind, or if you wish to skip any questions, pause, or withdraw from the study at any time, you are free to do so.

(Check if the patient has received the Participant Information Sheet. If not,

- a) offer them a copy now (if possible) and give them time to read it / offer to read it to them, or
- b) offer to read it out to them now (phone or face to face interview), or

- c) offer to send them a copy and make another time to discuss it.

Check their understanding of the project. Ask if they have any questions).

Would you like to take part in this study? (If yes, obtain consent in writing or witnessed audio-recorded verbal consent).

Is this a good time to talk now? (If yes, proceed with the interview. If no, set a date and time either by telephone or face to face).

Before we start, it is important to remember that we are interested in your experiences and views. There are no right or wrong answers to the questions. Just a reminder, only the research team from the university will listen to the interview recordings; no one in the hospital will know what your specific answers were. The results we present at the end will be from the group of all the patients combined.

First, a few questions about you:

- 1- Please can you describe your typical day?
- 2- Can you tell me about what you do on a daily basis to look after your heart health?
Or: what do you usually do to help manage your heart condition?
- 3- What changes, if any, have you made in your life in order to manage your heart condition?
- 4- Have there been any changes that you feel you should have made, but have not been able to? What are these? What made it difficult or stopped you making changes to your lifestyle?
 - a. What is your usual diet? How it has been affected by your heart condition and the treatment recommended to you? What about your food choices in meals, is there anything you need to do, or stop doing, for the sake of your heart condition that you have not done it before?
 - b. How often you weigh yourself? Same time of day?
 - c. Do you smoke? Have you quit smoking? How do you feel about your smoking?
Have you ever tried to quit? How has this been affected by your heart condition?

- d. Do you take regular physical activity? What do you do, typically? How often do you do this? Do you do exercise hard enough to make you breathe hard? Or get out of breath? Can you still talk while you exercise? How has your regular exercise been affected by your heart condition?
- e. What medicines are you taking? Are any of these new prescriptions since your heart condition? Do you take them exactly as prescribed? Have you experienced any side effects or problems with your medicines? Is it easy for you to get repeat prescriptions and get them filled? On time? Do you ever miss doses? If so, what happens to make you miss doses or stop taking them? Is there anything that helps you or makes it more difficult for you to stick to taking your medicines as prescribed?
- f. Thinking about the things that you have said you do to look after your heart health, is there anything that you feel is helpful for you in looking after your heart health? For example, is there anyone to help you? Did anyone teach you about your heart health? Has anyone given you any tips or tricks about looking after yourself? For example, given you advice about your diet / about exercising/ stopping smoking / managing your medicines? Is there anything that you feel makes it harder for you in looking after your heart health?
- g. Is there anything about your heart condition itself that makes it easier or harder to look after your heart health?
- h. Is there anything or anyone in your everyday life that makes it easier or harder to look after your heart health? Any family, friends or neighbours? Any clubs, mosque or other support groups?
- i. Do you think that your culture or your religion affect how you look after yourself? Are there any cultural or religious considerations that help or hinder you in looking after yourself and your heart health? Are there any cultural or religious practices that are helpful or a hindrance?

Is there anything else you think I should know or that you'd like to tell me about how you look after your heart health

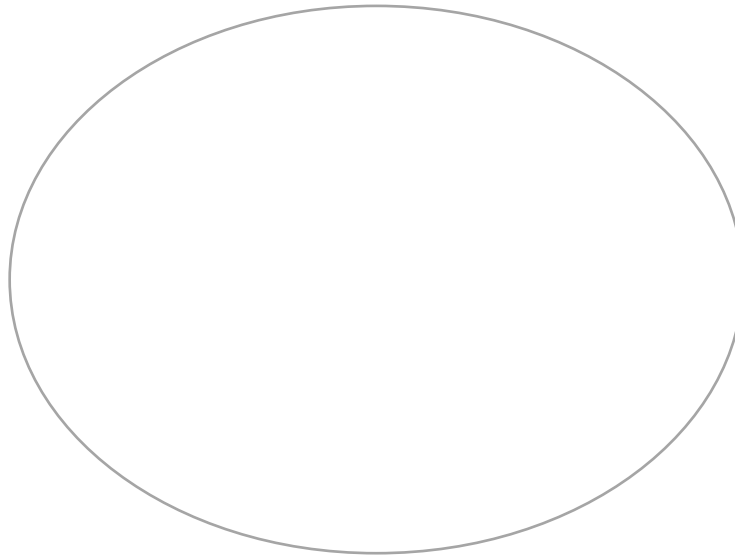
Appendix 5: English Version of Mini-Cog© Assessment

Step 1: Three words registration:

Please listen carefully. I am going to say three words that I want you to repeat back to me now and try to remember.

Step 2: Clock drawing (0 or 2 points)

Next, I want you to draw a clock for me: first put all of the numbers where they go. When that is completed, say, Now, set the hand to 10 past 11.



Step 3 three words recall: (0 or 3 points)

Now I would like to recall the three words that I told you earlier

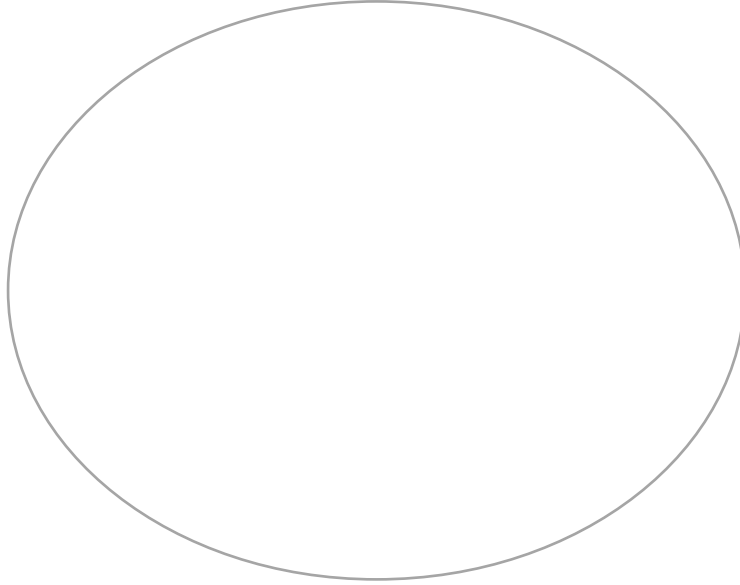
Word List version_____.

Person 's Answers: _____.

Appendix 6: Arabic Version of Mini-Cog© Assessment

(١) يي ! الاستماع -عناية. سأقول ثلاث «لمات أهدك أن تكررها في الآن وتحاول تذكرها

٢. أهدك أن ترسم ساعة من أجعل أولاً ضع «ل الأرقام في المكان الذي مذهبون إليه "عندما مكمّل ذلك ، قل " الآن ، اضبط العقرب ع ١٠. ١١ د



(٣) قل: " ما ع ا الملمات الثلاثة التي طلبت منك أن تتذكرها؟ "

.....

.....

.....

Appendix 7: Charlson Comorbidity Index

Score	Comorbid condition
1	Myocardial infarction Congestive heart failure Cerebral vascular disease Peripheral vascular disease Dementia Chronic obstructive pulmonary disease Connective tissue disease Peptic ulcer disease Mild liver disease Age*
2	Diabetes Hemiplegia Moderate/sever renal disease Diabetes with end-organ damage Any solid tumour Leukemia Lymphoma
3	Moderate/severe liver disease
6	Metastatic solid tumour acquired immune deficiency syndrome

*1 point is added to patients aged 41-50 years, 2 points for those aged 51-60 years, 3 points for those aged 61-70 years and 4 points for those 71 years or older

Appendix 8: English Version of the Sociodemographic and Clinical Information Sheet Section one

Part 1: About some clinical information extracted from your medical record file.

1) The patient's NYHA Class:

- ☐ NYHA I
- ☐ NYHA II
- ☐ NYHA III
- ☐ NYHA IV

2) Comorbidity (CCI score):

Part 2: Some questions about you and your heart health:

1) How old are you? (in years):

2) What is your gender?

- ☐ Male
- ☐ Female
- ☐ Other

3) What is your marital status?

- ☐ Single
- ☐ Married
- ☐ Divorced/Widowed
- ☐ Living with your spouse

4) Who lives with you at home?

- ☐ No-one, I live alone
- ☐ Partner or spouse
- ☐ Child or children: how many _____
- ☐ Adult child/ children (include daughter/ son-in-law):
how many _____
- ☐ Parent(s)
- ☐ Others, please describe relationship _____

5) Who takes care of you (unpaid or family care)? (By this we mean, who does routine things for you, such as gets your shopping, helps you bathe or shower etc)

- ☐ No-one, you take care of yourself
- ☐ Your partner or spouse
- ☐ Your children
- ☐ Other people, what is their relationship to you? (for example, friend, neighbour etc)

6) Do you pay anyone to take care of you? (For example, to clean your house, wash your clothes, help you bathe or shower, etc)

- ☐ No
- ☐ Yes, If yes, how many hours per week do they spend helping you?
(hours)

7) Do you find it difficult to read and/ or write?

- ☐ No
- ☐ Yes

8) What is the highest level of education you have completed?

- ☐ No education
- ☐ Primary school
- ☐ Middle school
- ☐ High school
- ☐ A vocational certificate / diploma
- ☐ An under-graduate university degree
- ☐ A post graduate degree (masters or doctoral degree)

9) What is your religion?

- ☐ Muslim
- ☐ Other (please specify?) _____.

10) How adequate is your family income for your family's daily needs?

- ☐ More than enough for my/family needs
- ☐ Suitable for my/family needs
- ☐ Less than enough for my needs/family needs

11) What is your employment status?

- ☐ Employed full time (in paid work for on average about 30 hours per week or more)
- ☐ Employed part time (in paid work for less than 30 hours per week)
- ☐ Unemployed (do not do any paid work but looking for paid work)
- ☐ Unemployed (do not work and do not want to work).
- ☐ Retired (no longer do any paid work and not looking for paid work)
- ☐ Do voluntary work (work other than housework for which you are not paid)
- ☐ Have main responsibility for housework and maintaining the home

12) What sorts of physical activity do you take part in?

- ☐ Walking outdoors with friends or family
- ☐ Walking outdoors alone
- ☐ Using a treadmill or other exercise equipment at home
- ☐ Going to an exercise class or group to exercise together not in your home
- ☐ Other exercise, please specify (for example swimming, Tai Chi, yoga)
- ☐ Don't do any physical exercise

13) What motivates you most to look after yourself and your heart?

- ☐ To improve your health.
- ☐ To live a longer life.
- ☐ To improve your quality of life.
- ☐ To be able to remain with your family for as long as possible.
- ☐ Other reason (please specify)_____.

14) Some people say that they find it difficult to make time to look after themselves.

Choose one of the following statements that best suits how you feel about your self-care.

- ☐ I don't have time to do self-care practices for my heart health.
- ☐ I don't have enough time to do all the self-care practices for my heart health that I would like.
- ☐ I try to make time for self-care to become routine, but I don't always achieve this.
- ☐ I try to make time, but I do not have enough time because of other more important commitments.
- ☐ I have time to do some self-care practices for my heart health.
- ☐ I have enough time to do the self-care practices I need for my heart health.

15) How many years is it since you were diagnosed with heart disease? _____.

16) How many times have you been admitted to hospital because of heart disease during the past year?_____.

17) In your opinion, how useful is the internet and social media such as Whatsapp, Twitter, YouTube or TikTok in self-care for heart health?

- ☐ Social media and the internet is a waste of time and useless.
- ☐ Social media and/ or the internet could be useful, but I can't use it.
- ☐ Friends or family use social media and/ or the Internet and find it helpful but I can't use it.
- ☐ I use social media and/ or the Internet but don't find it useful for self-care for heart health.
- ☐ I use social media and/ or the Internet and find it helpful for self-care for heart health.

18) Do you have any problems such as other health issues or other problems that prevent you from doing self-care activities for your heart health?

- ☐ No
- ☐ Yes. If yes, please state what the problems are:

_____.

19) Do you think your doctor or nurse gives you clear advice on how to look after your heart?

- ☐ No
- ☐ Yes

20) How comfortable do you feel to ask questions or discuss your concerns with your doctor or nurse?

- I am comfortable asking questions and discussing my concerns with my doctor or nurse.
- I am comfortable asking some but not all questions and discussing some concerns with my doctor or nurse.
- I am uncomfortable asking questions and discussing my concerns with my doctor or nurse.
- I usually don't ask questions or discuss my concerns with my doctor or nurse.

21) How many medications do you regularly take every day? ____.

22) Some people say they experience 'side-effects' of their heart medications - not just the desired effects that the doctor prescribed them for. Have you ever noticed any side effects of the medications you take for heart failure?

- I have never noticed any side effects.
- I have noticed minor side effects that I do not need to do anything about.
- I have noticed side effects that I cope with by making small changes such as choosing the most appropriate time for medication.
- I feel side effects and sometimes I miss taking a dose of medicine because of them
- I feel side effects and I want to stop the medication because of it.

23) How dissatisfied are you by side effects that interfere with your physical health and ability to function (e.g., strength, energy levels)?

- ☐ Extremely dissatisfied
- ☐ Very dissatisfied
- ☐ Somewhat dissatisfied
- ☐ Slightly dissatisfied
- ☐ Not at all dissatisfied

24) How dissatisfied are you by side effects that interfere with your mental function (e.g., ability to think clearly, stay awake)?

- ☐ Extremely dissatisfied
- ☐ Very dissatisfied
- ☐ Somewhat dissatisfied
- ☐ Slightly dissatisfied
- ☐ Not at all dissatisfied

25) How dissatisfied are you by side effects that interfere with your mood or emotions (e.g., anxiety/fear, sadness, irritation/anger)?

- ☐ Extremely dissatisfied
- ☐ Very dissatisfied
- ☐ Somewhat dissatisfied
- ☐ Slightly dissatisfied
- ☐ Not at all dissatisfied

Appendix 9: Arabic Version of the Sociodemographic and Clinical Information Sheet Section one

• الجزء الأول: بعض المعلومات المأخوذة من ملف المريض

(١) فئة المرض NYHA:

NYHA I ○

NYHA II ○

NYHA III ○

NYHA IV ○

(٢) درجة الاعتلال المشترك (درجة CCI):

• الجزء الثاني: بعض الأسئلة عنك وعن صحة قلبك:

(١) كم عمرك؟: _____ سنة

(٢) ما جنسك؟

أُنْثَى ○

ذَكَر ○

أُخْرَى ○

(٣) ماهي حالتك الاجتماعية؟

عازب ○

متزوج ○

مطلق أو أرمل ○

تغيش مع # أمك حماتك ○

٤) من يعيش معك في المنزل؟

- لا أحد ، أنا أعيش -مفرد
- أنا أو الزوج
- ولدك أو أولادك: «م» _____
- ولدك أو ولدك * ولدك (ما في ذلك الابنة * الصهر أو زوجة الابن) (م) العدد _____
- والدك
- الآخرون ، يو | وصف العلاقة _____

٥) من الذي يعتني بك (غير مدفوعة الأجر أو رعاية الأسرة)؟ (نعني بهذا ، من يقوم بأشياء الرعاية الذاتية اليومية من أجلك ، مثل الحصول على مشترياتك ، أو مساعدتك في الذهاب للحمام أو الاستحمام وما إلى ذلك)

- لا احد ، أقوم بها بنفسي
- أنا أو زوجتك
- اولادك
- الآخرون ، يو | وصف العلاقة عا سائل المثال ، صديق ، جار _____

٦) هل تدفع لأي شخص لرعايتك؟ (على سبيل المثال ، لتنظيف منزلك ، وغسل ملابسك ، ومساعدتك على الاستحمام أو الاستحمام ، وما إلى ذلك)

- لا
- نعم إذا «انت الإجابة بنعم» «م ساعة في الأسبوع ٢ قضاؤها في مساعدتك (ساعات)

٧) هل تجد صعوبة في القراءة و / أو الكتابة؟

- لا
- نعم

٨) ما هو أعلى مستوى تعليمي لديك؟

- لم اتعلم
- أتملت المدرسة الابتدائية
- أتملت المدرسة الإعدادية
- أتملت المدرسة الثانوية
- أتملت شهادة * دبلوم متعلق بعمل
- أتملت درجة جامعة
- أتملت درجة أعدا (ماجستير أو دكتوراه)

٩) ماهي ديانتك؟

- مسلم
- أخرى اذكرها

١٠) كيف ترى دخلك؟

- أقل من «أفٍ لاحتياجاتي» * احتياجات الأة
- مناسب لاحتياجاتي * احتياجات الأة
- أقل من «أفٍ لاحتياجاتي» * احتياجات الأة

١١) ما هو وضعك الوظيفي؟

- موظف - دوام «امل» (العمل - أجر، حوالي 30 ساعة في الأسبوع أو أكثر)
- موظف - دوام جزئي (أقل من 30 ساعة في الأسبوع)
- عاطل عن العمل (لا احصل ع أي دخل مقابل العمل، ولن أبحث عن عمل)
- عاطل عن العمل (لا احصل ع أي دخل مقابل العمل، ولا أبحث عن عمل)
- متقاعد (لم اعد اقوم بأي عمل مدفوع الأجر ولا أبحث عن عمل مدفوع الأجر)
- اقوم بعمل تطوعي (عمل - خلاف الأعمال الممنوعة التي لا تدفع لك مقابلها)
- احمل المسؤولية الرئيسية في الأعمال الممنوعة وصيانة المنزل

١٢) ما أنواع النشاط البدني الذي تشارك فيه ؟ (ضع علامة على كل ما ينطبق)

- الم#1E الهواة الطلق مع الأصدقاء أو العائلة
- الم#1E الهواة الطلق وحدي
- استخدام جهاز الم#1E أو أي معدات تمارين أخرى في المثل
- الذهاب إلى نادي أو مع مجموعة للتمارين في خارج المثل
- تمارين أخرى، يي | التحديد (ع) سقل المثل السباحة والتاي#1E واليوجا.
- لا امارس أي تمارين - الم#1E

١٣) ما أكثر ما يحفزك على الاعتناء بنفسك وبقلبك؟

- لتحسين صحتك
- لعيش حياة أطول
- لتحسين نوعية حياتك
- لتتمكن من الإبقاء مع عائلتك لأطول فترة ممكنة
- بعب آخر (يي | التحديد)

١٤) يقول بعض الناس إنهم يجدون صعوبة في تخصيص الوقت للاعتناء بأنفسهم. اختر إحدى العبارات التالية التي تناسب شعورك حيال رعايتك الذاتية.

- ليس لدي الوقت للقيام بممارسات الرعاية الذاتية لصحة قلبي.
- لا أملك الوقت للقيام بجميع ممارسات الرعاية الذاتية لصحة قلبي التي أرغب فيها.
- أحاول تخصيص الوقت لأن تصبح الرعاية الذاتية روتينية، لئلا لا أحقق ذلك دائماً.
- أحاول توفير الوقت، لئلا ليس لدي الوقت للقيام بممارسات الرعاية الذاتية الأخرى الآن أهمية
- لدي الوقت للقيام ببعض ممارسات الرعاية الذاتية لصحة قلبي.
- لدي الوقت للقيام بممارسات الرعاية الذاتية التي أحتاجها لصحة قلبي.

١٥) منذ كم سنة تم تشخيصك بمرض القلب؟

١٦) كم مرة دخلت المستشفى بسبب مرض القلب خلال العام الماضي؟

١٧) برأيك، ما مدى فائدة وسائل التواصل الاجتماعي مثل الواتساب وتويتر واليوتيوب والتيك توك والإنترنت في الرعاية الذاتية لصحة القلب؟

- وسائل التواصل الاجتماعي H والإدثنت مضجعة للوقت وغوٲا مجددة
- قد تكون وسائل التواصل الاجتماعي H و* أو الإدثنت مفيدة ، E ن لا مكففة استخدامها
- Yستخدم الأصدقاء أو العائلة وسائل التواصل الاجتماعي H و* أو الإدثنت وجدونها مفيدة وE ن لا مكففة استخدامها
- أستخدم وسائل التواصل الاجتماعي H و* أو الإدثنت وE ن لا أجدها مفيدة للعناية الذاتية - صحة القلب
- أستخدم وسائل التواصل الاجتماعي H و* أو الإدثنت وأجدها مفيدة للرعاية الذاتية لصحة القلب

١٨) هل لديك أي مشكله صحية أخرى أو غيرها من المشاكل التي تمنعك من القيام بأنشطة الرعاية الذاتية لصحة قلبك؟

- لا
- نعم. إذا«انت الإجاة بنعم ، يو | ذكر ما عا المشال _____.

١٩) هل تعتقد أن طبيبك أو ممرضتك يعطيك نصائح واضحة حول كيفية الاعتناء بقلبك؟

- لا
- أنعم

٢٠) ما مدى شعورك بالراحة عند طرح الأسئلة أو مناقشة مخاوفك مع طبيبك أو ممرضتك؟

- أنا مرتاح لط ج الأسئلة ومناقشة مخاوفي مع طبيبي أو ممرضتي
- أنا مرتاح لط ج -عض الأسئلة ولأس«لها ومناقشة -عض المخاوف مع طبيبي أو ممرضتي.
- أشعر -عدم الارتاح لط ج الأسئلة ومناقشة مخاوفي مع طبيبي أو ممرضتي.
- عادة لا أط ج أسئلة أو أناقش مخاوفي مع طبيبي أو ممرضتي

٢١) كم عدد الأدوية التي تتناولها بانتظام كل يوم؟ _____.

٢٢) يقول بعض الناس إنهم يعانون من "الآثار الجانبية" لأدوية القلب - وليس فقط الآثار المرغوبة التي وصفها الطبيب لهم. هل سبق لك أن لاحظت أي آثار جانبية للأدوية التي تتناولها لعلاج قصور القلب؟

- لم ألاحظ أي آثار جانبية
- لقد لاحظت آثارًا جانبية طفيفة ولست بحاجة إلى فعل أي شيء حالها
- لقد لاحظت آثارًا جانبية أتعامل معها من خلال إجراء تغييرات صغيرة مثل اختيار الوقت المناسب للدواء
- أشعر بآثار جانبية وأحيانًا أترك تناول جرعة من الدواء سببها
- أشعر بآثار جانبية وألحد التوقف عن تناول الدواء سبب ذلك

٢٣) ما مدى استيائك من الآثار الجانبية التي تتداخل مع صحتك الجسدية وقدرتك على العمل (على سبيل المثال، القوة ومستويات الطاقة)؟

- غني راضي تمامًا
- غني راضي للغاية
- غني راضي إلى حد ما
- غني راضي قليلًا
- لست غني راضي

٢٤) ما مدى استيائك من الآثار الجانبية التي تتداخل مع وظيفتك العقلية (على سبيل المثال ، القدرة على التفكير بوضوح ، البقاء مستيقظًا)؟

- غني راضي تمامًا
- غني راضي للغاية
- غني راضي إلى حد ما
- غني راضي قليلًا
- لست غني راضي

٢٥) ما مدى استيائك من الآثار الجانبية التي تتداخل مع مزاجك أو عواطفك (مثل القلق / الخوف والحزن والتهيج / الغضب)؟

- غرر راضى تمامًا
- غرر راضى للغاية
- غرر راضى إى حدٍ ما
- غرر راضى قليلًا
- لست غرر راضى

Appendix 10: English Version of Self-Care of Heart Failure Index (SCHFI)
v.6.2

Listed below are common instructions given to persons with heart failure. Please circle the answer that best describes your response.

How routinely do you do the following activities?

1) Weigh yourself?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

2) Check your ankles for swelling?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

3) Try to avoid getting sick (e.g., get flu vaccination, avoid ill people)?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

4) Do some physical activity?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

5) Keep your doctor or nurse appointments?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

6) Eat a low salt diet?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

7) Exercise for 30 minutes daily?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

8) Forget to take your medicines?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

9) Ask for low salt items when eating out or visiting others?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

10) Use a system, such as pill box reminders to help you remember your medicines?

- ☐ Never or rarely
- ☐ Sometimes
- ☐ Frequently
- ☐ Always or daily

11) Many patients have symptoms due to their heart failure. Trouble breathing and ankle swelling are common symptoms of heart failure.

In the past month, have you had trouble breathing or with ankle swelling? (Circle one).

- ☐ No
- ☐ Yes

If you had trouble breathing or ankle swelling in the past month, how quickly did you recognise it as a symptom of heart failure?

(Circle one answer that best describes your response)

- ☐ Have not had a symptom
- ☐ I did not recognise it
- ☐ Not quickly
- ☐ Somewhat quickly
- ☐ Quickly
- ☐ Very quickly

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? (Circle one answer)

12) Reduce the salt in your diet

- ☐ Not likely
- ☐ Somewhat likely
- ☐ Likely
- ☐ Very likely

13) Reduce your fluid intake

- ☐ Not likely
- ☐ Somewhat likely
- ☐ Likely
- ☐ Very likely

14) Take an extra water pill

- ☐ Not likely
- ☐ Somewhat likely
- ☐ Likely
- ☐ Very likely

15) Call your doctor or nurse for guidance

- ☐ Not likely
- ☐ Somewhat likely
- ☐ Likely
- ☐ Very likely

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

How sure were you that the remedy helped or did not help? (Circle one answer)

- ☐ I did not try anything
- ☐ Not sure
- ☐ Somewhat sure
- ☐ Sure
- ☐ Very sure

For the following questions, circle the choice that best describes your response.

In general, how confident are you that you can:

17) Keep yourself free of heart failure symptoms?

- ☐ Not confident
- ☐ Somewhat confident
- ☐ Very confident
- ☐ Extremely confident

18) Follow the treatment advice you have been given?

- ☐ Not confident
- ☐ Somewhat confident
- ☐ Very confident
- ☐ Extremely confident

19) Evaluate the importance of your symptoms?

- ☐ Not confident
- ☐ Somewhat confident
- ☐ Very confident
- ☐ Extremely confident

In general, how confident are you that you can:

20) Recognise changes in your health if they occur?

- ☐ Not confident
- ☐ Somewhat confident
- ☐ Very confident
- ☐ Extremely confident

21) Do something that will relieve your symptoms?

- ☐ Not confident
- ☐ Somewhat confident
- ☐ Very confident
- ☐ Extremely confident

22) Evaluate how well a remedy works?

- ☐ Not confident
- ☐ Somewhat confident
- ☐ Very confident
- ☐ Extremely confident

Appendix 11: Arabic version of Self-care of Heart Failure Index (SCHFI) v.6.2

يحتوي هذا القسم على بعض الأسئلة حول الأنشطة اليومية التي يذكرها العديد من الأشخاص كجزء من يومهم المعتاد، لرعاية أمراض القلب

قسم ١: المذكورة أدناه هي تعليمات عامة تتوفر عادةً لأشخاص عندهم ضعف في عضلة القلب

ما مدى تكرار ممارستك لهذه التعليمات

١) اخذ الوزن

- دائماً أو نادراً
- أحياناً
- متكرر
- دائماً أو يومياً

٢) التحقق من ورم كاحلك

- دائماً أو نادراً
- أحياناً
- متكرر
- دائماً أو يومياً

٣) تجنب المرض (لقاح/ طعم الأنفلونزا وتجنب الأشخاص المصابة بالمرض)

- دائماً أو نادراً
- أحياناً
- متكرر
- دائماً أو يومياً

٤) القيام ببعض النشاط الجسدي

- ☐ أ نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

٥) الحضور عند موعدك المحدد مع الطبيب

- ☐ أ نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

٦) اكل طعام قليل الملح

- ☐ أ نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

٧) التمرين ل ٣٠ دقيقة يوميًا

- ☐ أ نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

٨) نسيان اخذ واحد من ادويتك

- ☐ نادرًا أو نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

٩) طلب طعام قليل الملح عند الاكل خارج المنزل او عند زياره الاخرين

- ☐ نادرًا أو نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

١٠) استعمال منظم مثل علبة ادويه او المنبه ليساعدك في تذكر اخذ الادويه

- ☐ نادرًا أو نادرًا
- ☐ أحيانًا
- ☐ متكرر
- ☐ دائمًا أو يوميًا

قسم ب:

الكثير من الأشخاص يعانون من عوارض بسبب ضعف في عضلة القلب. الصعوبة بالتنفس وتورم الكاحلين هي عوارض

خلال الشهر الفائت: هل عانيت من صعوبة بالتنفس أو تورم في الكاحلين؟ ضع دائرة حول إجابة وحدة

- ☐ لا
- ☐ نعم

(١١) في حال أصبت بصعوبة في التنفس أو تورم في الكاحلين خلال الشهر الفائت ... (اختر الجواب المناسب)

ما هي سرعة تعرفك على العارض على أنه بسبب ضعف في عضلة القلب؟

- لم اصب بها
- لم اتعرف عليه
- آسرا له
- 'W عه سااا
- 'W عه
- 'W عه فآقه

المذكورة أدناه هي طرق علاج يستعملها بعض الأشخاص المصابين بضعف عضلة القلب. اذا أصبت بصعوبة في التنفس أو تورم بالكاحلين، ما نسبة لجوئك الى تجربة واحدة من هذه العلاجات؟ (ضع دائرة على واحدة من هذه الإجابات)

(١٢) تخفيف كمية الملح في طعامك

- غؤ مرجح
- مرجح سااا
- مرجح
- مرجح جذا

(١٣) تخفيف كمية السوائل

- غؤ مرجح
- مرجح سااا
- مرجح
- مرجح جذا

١٤) اخذ حبه اضافيه من مدر البول

- غُوْٓ مرجح
- مرجح ^eas2a
- مرجح
- مرجح جءا ^e

١٥) الاتصال بطبيبك لارشادك

- غُوْٓ مرجح
- مرجح ^eas2a
- مرجح
- مرجح جءا ^e

١٦) فكر في علاج قد لجأت إليه آخر مرة تعرضت لصعوبة في التنفس أو تورم في الكاحلين (ضع دائرة على احدى الأرقام) ما مدي ثقتك بنجاح هذا العلاج؟

- لم اخُوْٓ شأنا
- لست واثق
- واثق ^eas2a
- واثق
- واثق جدا

بقسم ج: شكل عام، ما مدى ثقتك بقدرتك على

١٧) تجنب عوارض ضعف عضلة القلب

- غُوْٓ واثق
- واثق إى حد ما
- واثق جدا
- واثق للغاية

(١٨) اتباع النصائح في العلاج المعطاة لك

- ☐ غرئ واثق
- ☐ واثق إِي حد ما
- ☐ واثق جدا
- ☐ واثق للغاية

(١٩) تقييم اهميه عوارضك

- ☐ غرئ واثق
- ☐ واثق إِي حد ما
- ☐ واثق جدا
- ☐ واثق للغاية

(٢٠) التعرف علي تغيير في حالتك الصحيه فور حدوثها

- ☐ غرئ واثق
- ☐ واثق إِي حد ما
- ☐ واثق جدا
- ☐ واثق للغاية

(٢١) التصرف لمعالجه عوارضك

- ☐ غرئ واثق
- ☐ واثق إِي حد ما
- ☐ واثق جدا
- ☐ واثق للغاية

٢٢) تقييم مدي فاعليه العلاج

- غرث واثق
- واثق إى حد ما
- واثق جدا
- واثق للغاية

Appendix 12: English Version of The Dutch Heart Failure Knowledge Scale (DHFKS)

Please circle the option that best reflects what you think.

1) How often should patients with heart failure weigh themselves?

- ☐ Every week
- ☐ Now and then
- ☐ Every day

2) Why is it important that patients with heart failure weigh themselves regularly?

- ☐ Because many patients with heart failure have a poor appetite
- ☐ To know if their heart failure is getting worse or not

3) How much fluid are you allowed to drink at home each day?

- ☐ 1.5-2 liters at the most
- ☐ As little fluid as possible
- ☐ As much fluid as possible

4) Which of these statements are true?

- ☐ When I cough a lot, it is better not to take my heart failure medications
- ☐ When I am feeling better, I can stop taking my heart failure medications
- ☐ It is important that I take my heart failure medications regularly

5) What is the best thing to do in case of increased shortness of breath or swollen legs?

- ☐ Call the doctor or the nurse
- ☐ Wait until the next check-up
- ☐ Take less medications

6) What can cause a rapid worsening of heart failure symptoms?

- A high fat diet
- A cold or the flu
- Lack of exercise

7) What does heart failure mean?

- That the heart is unable to pump enough blood to the body
- That someone is not getting enough exercise and is in poor condition
- That there is blood clot in the blood vessel of heart

8) Why can the legs swell up when you have heart failure?

- Because the valves in the blood vessels in the legs do not function properly
- Because the muscles in the legs are not getting enough oxygen
- Because of accumulation of fluid in the legs

9) What is the function of the heart?

- To absorb nutrients from the blood
- To pump blood around the body
- To provide blood with oxygen

10) Why should someone with heart failure follow a low salt diet?

- Salt promotes fluid retention
- Salt causes constriction of the blood vessels
- Salt increases the heart rate

11) What is the main cause of heart failure?

- A myocardial infarction and high blood pressure
- Lung problems and allergy
- Obesity and diabetes

12) Which statement about exercise for people with heart failure is true?

- It is important to exercise as little as possible at home in order to relieve the heart
- It is important to exercise at home and to rest regularly in between
- It is important to exercise as much as possible at home

13) Why are water pills prescribed to someone with heart failure?

- To lower the blood pressure
- To prevent the fluid retention in the body
- Because then they can drink more

14) Which statement about weight increase and heart failure is true?

- An increase of over 2 Kg in 2 or 3 days, should be reported to the doctor at the next check-up
- An increase of over 2 Kg in 2 or 3 days, you should contact your doctor or nurse
- An increase of over 2 Kg in 2 or 3 days, you should eat less.

15) What is the best thing to do when you are thirsty?

- Suck an ice cube
- Suck a lozenge
- Drink a lot

Appendix 13: Arabic Version of The Dutch Heart Failure Knowledge Scale (DHFKS)

²حتوي هذا الجزء على خمسة أسئلة 'سؤالاً تدور حول قياس مستوى المعرفة -مرض فشل عضلة القلب الرجاء اختيار رمز الإجابة الصحيحة في كل مما يلي:

(١) كم مرة عادة يجب على المرضى المصابين بفشل شديد في عضلة القلب توزيع أنفسهم؟

- مرة «كل أسبوع
- يومين الحرق والآخر
- مرة «كل يوم نفس الوقت

(٢) لماذا من المهم يجب على المرضى المصاب بفشل في عضلة القلب توزيع أنفسهم بشكل منتظم؟

- لأن العثر من المرة g المصاب بفشل عضلة القلب عندهم فقدان الشهية
- لمعرفة ما إذا «ان قصور القلب لديهم يزداد سوءاً أم لا

(٣) كم هي كمية السوائل المسموح لك تناولها كل يوم؟

- ٢,٥-١,٥ ليتر «الآن
- أقل «ممكنة من السوائل
- أكثر «ممكنة من السوائل

(٤) أي من الجمل التالية صحيح؟

- عندما اسعلا مشل كبر، من الجهد أن لا أخذ الدواء الخاص -فشل القلب
- عندما أشعر -صحة جيدة، إستطيع إيقاف تناول الدواء الخاص -فشل القلب
- من الآن كوري أن أخذ دواء فشل القلب بانتظام

٥) ما هو أفضل شيء تقوم به في حالة زيادة صعوبة النفس أو إنتفاخ القدمين؟

- الإتصال بالطبيب أو الممرض
- الإنتظار حتى تأتى الفحص القادم
- أخذ دواء أقل

٦) ما هو الشيء الذي يؤدي إلى تدهور سريع لأعراض مرض فشل القلب؟

- الطعام العالي - الدهنيات
- الرش أو الانفلونزا
- عدم القيام - التمارين الرياضية

٧) ما المقصود بفشل القلب؟

- عدم قدرة القلب على ضخ «مخات» كافية من الدم حول أنحاء الجسم
- عدم قدرة الشخص - القيام - التمارين الرياضية و مروره - كوف صحة سليمة
- وجود خثرة دموية داخل الاوعية الدموية الموجودة في القلب

٨) لماذا يحدث إنتفاخ في القدمين عند حدوث فشل في القلب؟

- لأن الصمامات الموجودة في الاوعية الدموية في القدمين لا تعمل بشكل جيد
- لأن العضلات الموجودة في القدمين لا تحصل على أكسجين كافية
- لأن السوائل في القدمين تتركز

(٩) ما هي وظيفة القلب؟

- لإمتصاص الغذاء من الدم
- لضخ الدم حول أنحاء الجسم
- لنقل الدم - الأوكسجين

(١٠) لماذا يجب على المصاب بفشل في القلب تناول طعام قليل الملح؟

- يهدد الملح من إحتباس السوائل في الجسم
- يؤدي الملح إلى إنقباض الأوعية الدموية
- يهدد الملح عدد دقات القلب

(١١) ما هو السبب الرئيس لفشل عضلة القلب؟

- إحتشاء عضلة القلب (الجلطة القلبية) وارتفاع ضغط الدم
- مشكلات في الرئة وتحسس
- السمنة و السكري

(١٢) أي من الجمل التالية يعتبر صحيحا عن التمارين الرياضية للناس المصابين بفشل في عضلة القلب؟-

- من الإكثاري التمرام - أقل قدر ممكن من التمارين الرياضية في المثل لا يحق القلب
- من المهم ان تمارس التمارين الرياضية في المثل بانتظام وأن تأخذ فترة راحة بين التمارين
- من الإكثاري التمرام - أقل قدر ممكن من التمارين الرياضية في المثل

١٣) لماذا يتم وصف أدوية مدرة للبول للشخص المصاب بفشل في عضلة القلب؟

- للتقليل من ضغط الدم
- لمنع إحتباس السوائل في الجسم
- لأنه يستطيع #ب «حقة سوائل أخرى

١٤) أي من الجمل التالية يعتبر صحيحا عن زيادة الوزن وفشل القلب؟

- ² يجب إلاغ الطَّبيب عند زيادة أُلأ من ٢ كُلوغرام في الوزن خلال ٢-٣ أسابيع القادمة
- ² يجب الإلتصال بالطَّبيب أو الممرض عند زيادة أُلأ من ٢ كُلوغرام في الوزن خلال ٢-٣ أسابيع
- ² يجب تناول «حقة طعام اقل عند زيادة أُلأ من ٢ كُلوغرام في الوزن خلال ٢-٣ أسابيع

١٥) ما هو أفضل شيء تقوم به عندما تكون عطشان؟

- مص قطعة من الثلج
- #ب إلتئ من السوائل
- مص قطعة من الديرس (السكر الفءة)

Appendix 14: English Version of Multidimensional Scale of Perceived Social Support (MSPSS)

We are interested in how you feel about the following statements. Read each statement carefully and circle one answer.

1) There is a special person who is around when I am in need.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

2) There is a special person with whom I can share joys and sorrows.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

3) My family really tries to help me.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

4) I get the emotional help & support I need from my family.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

5) I have a special person who is a real source of comfort to me.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

6) My friends really try to help me.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

7) I can count on my friends when things go wrong.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

8) I can talk about my problems with my family.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

9) I have friends with whom I can share my joys and sorrows.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

10) There is a special person in my life who cares about my feelings

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

11) My family is willing to help me make decisions.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

12) I can talk about my problems with my friends.

- ☐ Very strongly disagree
- ☐ Strongly disagree
- ☐ Mildly disagree
- ☐ Neutral
- ☐ Mildly agree
- ☐ Strongly agree
- ☐ Very strongly agree

Appendix 15: Arabic Version of Multidimensional Scale of Perceived Social Support (MSPSS)

الأسئلة التالية تتعلق بالدعم الذي تحبّه x هـ من حولك. نحن مهتمون بمشعر هـ حقال العبارات التالية. اقرأ «ل
عمارة - عناية ووضوح كلفلمشعر حقال «ل عمارة

(١) هناك شخص مميز دائما بجانبني عندما احتاجه

- العنصر لا يشده
- العنصر - اعتدال
- العنصر قليلا
- حاد
- أوافق قليلا
- أوافق - اعتدال
- أوافق لا يشده

(٢) هناك شخص مميز أستطيع ان أشارك افراحي واحزاني معه

- العنصر لا يشده
- العنصر - اعتدال
- العنصر قليلا
- حاد
- أوافق قليلا
- أوافق - اعتدال
- أوافق لا يشده

٣) عائلي تحاول مساعدتي

- ☐ العنصر لا شدة
- ☐ العنصر - اعتدال
- ☐ العنصر قليلا
- ☐ حمادي
- ☐ أوافق قليلا
- ☐ أوافق - اعتدال
- ☒ أوافق لا شدة

٤) انال مساعده عاطفيه ودعم من عائلي

- ☐ العنصر لا شدة
- ☐ العنصر - اعتدال
- ☐ العنصر قليلا
- ☐ حمادي
- ☐ أوافق قليلا
- ☐ أوافق - اعتدال
- ☒ أوافق لا شدة

٥) هناك شخص مميز هو/ هي مصدر حقيقي للراحة لي

☐ الغضب الشديد

☐ الغضب - اعتدال

☐ الغضب قليلا

☐ حمادي

☐ أوافق قليلا

☐ أوافق - اعتدال

☒ أوافقا شدة

٦) أصدقائي يحاولون مساعدتي

☐ الغضب الشديد

☐ الغضب - اعتدال

☐ الغضب قليلا

☐ حمادي

☐ أوافق قليلا

☐ أوافق - اعتدال

☒ أوافقا شدة

٧) بإمكانني الاعتماد على أصدقائي عندما تجري الأمور بشكل سي

- ☐ العنصر ٧: شدة
- ☐ العنصر ٧: اعتدال
- ☐ العنصر ٧: قلة
- ☐ حمادي
- ☐ أوافق قلة
- ☐ أوافق - اعتدال
- ☒ أوافق ٧: شدة

٨) بإمكانني التحدث عن مشاكي مع عائلتي

- ☐ العنصر ٧: شدة
- ☐ العنصر ٧: اعتدال
- ☐ العنصر ٧: قلة
- ☐ حمادي
- ☐ أوافق قلة
- ☐ أوافق - اعتدال
- ☒ أوافق ٧: شدة

٩) عندي اصدقاء أستطيع ان أشارك افراحي واحزاني معهم

- ☐ الغائب - لم يرد
- ☐ الغائب - اعتدال
- ☐ الغائب - قلة
- ☐ حمادي
- ☐ أوافق - قلة
- ☐ أوافق - اعتدال
- ☒ أوافق - لم يرد

١٠) هناك شخص مميز في حياتي يهتم في مشاعري

- ☐ الغائب - لم يرد
- ☐ الغائب - اعتدال
- ☐ الغائب - قلة
- ☐ حمادي
- ☐ أوافق - قلة
- ☐ أوافق - اعتدال
- ☒ أوافق - لم يرد

(١١) عائلتي ترغب في مساعدتي لاتخاذ القرارات

- ☐ العائنضلا شده
- ☐ العائنض - اعتدال
- ☐ العائنض قفلا
- ☐ حادي
- ☐ اوافق قفلا
- ☐ اوافق - اعتدال
- ☒ اوافقلا شده

(١٢) أستطع ان اتحدث عن مشاكلي مع أصدقائي

- ☐ العائنضلا شده
- ☐ العائنض - اعتدال
- ☐ العائنض قفلا
- ☐ حادي
- ☐ اوافق قفلا
- ☐ اوافق - اعتدال
- ☒ اوافقلا شده

Appendix 16: English Version of Hospital Anxiety and Depression Scale (HADS)

Please read each statement and mark the one response that best reflects how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

1) I feel tense or 'wound up'.

- ☐ Most of the time
- ☐ A lot of the time
- ☐ From time to time, occasionally
- ☐ Not at all

2) I still enjoy the things I used to enjoy.

- ☐ Definitely as much
- ☐ Not quite so much
- ☐ Only a little
- ☐ Hardly at all

3) I get a sort of frightened feeling as if something awful is about to happen.

- ☐ Very definitely and quite badly
- ☐ Yes, but not too badly
- ☐ A little, but it doesn't worry me
- ☐ Not at all

4) I can laugh and see the funny side of things.

- ☐ As much as I always could
- ☐ Not quite so much now
- ☐ Definitely not so much now
- ☐ Not at all

5) Worrying thoughts go through my mind.

- ☐ A great deal of the time
- ☐ A lot of the time
- ☐ From time to time, but not too often
- ☐ Only occasionally

6) I feel cheerful.

- ☐ Not at all
- ☐ Not often
- ☐ Sometimes
- ☐ Most of the time

7) I can sit at ease and feel relaxed.

- ☐ Definitely
- ☐ Usually
- ☐ Not often
- ☐ Not at all

8) I feel as if I am slowed down.

- ☐ Nearly all the time
- ☐ Very often
- ☐ Sometimes
- ☐ Not at all

9) I get a sort of frightened feeling like 'butterflies' in the stomach.

- ☐ Not at all
- ☐ Occasionally
- ☐ Quite Often
- ☐ Very Often

10) I have lost interest in my appearance.

- ☐ Definitely
- ☐ I don't take as much care as I should
- ☐ I may not take quite as much care
- ☐ I take just as much care as ever

11) I feel restless as I have to be on the move.

- ☐ Very much indeed
- ☐ Quite a lot
- ☐ Not very much
- ☐ Not at all

12) I look forward with enjoyment to things.

- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

13) I get sudden feelings of panic.

- Very often indeed
- Quite often
- Not very often
- Not at all

14) I can enjoy a good book or radio or TV program.

- Often
- Sometimes
- Not often
- Very seldom

Appendix 17: Arabic Version of Hospital Anxiety and Depression Scale (HADS)

اقرأ «ل من النصوص التالية ثم اذكر الشعور الذي ينطبق عليك في الأسابيع الماضية. لا يوجد إجابات صحيحة أو خاطئة. لا تقلق ولا تفرح ولا تملأ الفراغ بأي منها.

(١) أحس بأنني هامد (فاقد للطاقة).

- تقضي في «ل وقت
- في كثير من الأحيان
- في بعض الاوقات
- لا اشعر - ذلك مطلقا

(٢) يتتابني شعور بالخوف.

- لا اذ اطلاق
- انا
- كثير
- في اغلب الاوقات

(٣) لقد فقدت الاهتمام بمظهري.

- آلتأخذ فقدت «ل الاهتمام
- انا لا اهتم - مظهري «ما يجب ان اهتم
- قد لا اعرف - مظهري «ما يجب
- اعرف - مظهري «شأن جدد «ما كنت سابقا

٤) الإحساس بضيق الصدر دون مجهود جسدي.

- في الواقع كثير جداً
- كثير لا أساس له
- أشعر بذلك قليلاً
- لا أشعر بذلك إطلاقاً

٥) أنا أتطلع للأشياء من حولي باستمتاع.

- -قدر ما يمكن فعله
- نوعاً ما ألتفتت إليه
- آلتأخذ أقل مما اعتدت عليه
- لا ألتفت إليه إطلاقاً

٦) ينتابني إحساس مفاجئ بالهلع.

- في الواقع كثير من الأحيان
- غالباً
- ليس كثيراً
- لا أشعر بذلك إطلاقاً

٧) يمكنني الاستمتاع بقراءة كتاب جيد او مشاهدته البرامج التلفزيونية او الاستماع الي الإذاعة.

- غالبا
- في بعض الأحيان
- لاس كثيرا
- نادرا جدا

٨) اشعر بالتوتر الشديد.

- الآن الوقت
- عدة مرات
- احيانا
- لا اشعر - ذلك مطلقا

٩) انا لازلت اتمتع بالأشياء التي اعتدت ان استمتع بها.

- آلتأخذ«ما كنت
- آس تماما
- قهلا
- -الناد، ع الاطلاق

١٠) اشعر بنوع من الخوف وكان شيئاً مروعا على وشك الحدوث.

- آلتأخّذ هاشئلا مزعج
- نعم ولاحن اقل سوء
- قللا لا كنه لا مقلع
- لا اشعر -ذلك عØ الاطلاق

١١) أستطيع الضحك ورؤية الجوانب الممتعة في الأشياء.

- هآا كنت سآقا
- اقل مما كنت سآقا
- -التأخّذ لآس كثرنا الان
- لا اشعر -ذلك عØ الاطلاق

١٢) تأتيني دائما أفكار مقلقه.

- اغلب الوقت
- معظم الوقت
- من وقت لآخر ولاحن لآس كثرنا
- أآانا

١٣) اشعر بالبهجة.

- لا عدّ الاطلاق
- لّيس كثيرًا
- فمّ - عض الاحقان
- فمّ اغلب الاوقات

١٤) يمكنني الجلوس براحه والشعور بالاسترخاء.

- اّل التأخّد
- عاده ماء
- لّيس كثيرًا
- لا ممكّن ذلك عدّ الاطلاق

Appendix 18: English Version of The Medication Adherence Report Scale (MARS-5)

Many people find a way of using their medicines which suits them. This may differ from the instructions on the label or from what the doctor has said. We would like to ask you a few questions about how you use your heart medicines. Here are some ways in which people have said that they use their medicines. For each of the statements, please choose the option which best applies to you, whether you do this always, often, sometimes, rarely or never. We just want to know about your own way of using your heart medicines:

26) I forget to take them.

Always.	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27) I change the dose/amount I was prescribed to take.

Always	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28) I stop taking them for a while.

Always	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29) I decide to miss out a dose.

Always	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30) I take less than instructed.

Always	Often	Sometimes	Rarely	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 19: Arabic Version of The Medication Adherence Report Scale (MARS-5)

يُجد E٢ من الناس طَريقة لاستخدام أدويةهم تناسبهم. قد يختلف هذا عن التعليمات الموجودة على الملصق أو عما قاله الطبيب. نود أن نسألك - بعض الأسئلة حول كيفية استخدامك لأدوية القلب. فَمَا ٢ - بعض الطرق التي قال الناس من خلالها إنهم يستخدمون أدويةهم. لئلا من العبارات، يي | تحدد الخيار الأفضل - النسبة لك، سواء كنت تفعل ذلك دائماً، غالباً، أحياناً، نادراً أو أبداً. نريد فقط معرفة طَريقة الخاصة بك استخدام أدوية القلب:

(٢٦) نسيت أن أخذهم

دائماً	في كثير من الأحيان	أحياناً	نادراً	أبداً
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(٢٧) أقوم بتغيير الجرعة / الكمية التي تم وصفها لي

دائماً	في كثير من الأحيان	أحياناً	نادراً	أبداً
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(٢٨) أتوقف عن أخذهم لفترة

دائماً	في كثير من الأحيان	أحياناً	نادراً	أبداً
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(٢٩) قررت تفويت جرعة

دائماً	في كثير من الأحيان	أحياناً	نادراً	أبداً
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(٣٠) آخذ جرعة أقل من التعليمات

دائماً	في كثير من الأحيان	أحياناً	نادراً	أبداً
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 20: Ethical Approval Letter from the Ethical Research Committee of the Research Centre Affiliated with the Heart Centre at KASH



Research Ethics Committee
Qurayyat Health Affairs
Registered with NCBE
Reg NO: H-13-S-071

Date: 21/12/2021
No: 114

APPROVAL NOTICE

Principal Investigator	Ms. Hamdah Faied Alshammari	Affiliation	Jouf University
Email		Project No	114
Approval Date	21/12/2021	Approval Expiry Date	21/12/2022
Project Title	Factors affecting self-care adherence in patients with heart failure in Aljouf region, Saudi Arabia		

The above proposed study has been approved on the basis of the information contained in the application and its attachments.

The Principal Investigator and the research team shall take the following into consideration during the implementation of the research project:

- In case the research team needs an extension, the principal investigator will submit an extension request to the Department of Research and Studies at Qurayyat Health Affairs, with the need to explain the justification for the extension request.
- The Principal Investigator is obliged to obtain and keep informed consents - for all the participants involved in the research / study - and make them available to the Committee if the Committee requests them for the purpose of review and evaluation.
- The Principal Investigator is committed to providing the Committee and the Research Department with periodic reports on the progress of the research and informing the Committee of any amendments to the research project to re-evaluate the research as necessary.
- The Principal Investigator and the research team shall undertake the research in accordance with the regulations issued by the Saudi National Committee for Bioethics.

With sincere wishes for the research team of success.

Production Note:

Signature removed prior to publication.

Mohammed Alruwaili, MSC.
Chairman of the Local Research Ethics Committee
Qurayyat Health Affairs
Email: rsd-qurt@moh.gov.sa

Appendix 21: UTS Ethical Application and Approval Letter



Ethics Application

Application ID :	ETH21-6435
Application Title :	Factors affecting self-care adherence in patients with heart failure in Saudi Arabia
Date of Submission :	01/11/2021
Primary Investigator :	Prof Lin Perry (Chief Investigator)
Other Personnel :	Mrs Hamdah Faied K Alshammari (5Research Student) Dr Leila Gholizadeh (Co-Supervisor)



Appendix 22: Participant Information Statement Phase One

<p>PARTICIPANT INFORMATION SHEET (PIS) Factors affecting self-care adherence in patients with heart failure in Saudi Arabia HREC registration number: HREC Approval No. ETH21-6435</p> <p>WHO IS DOING THE RESEARCH? My name is Hamdah Faied Alshammari and I am a student at University of Technology Sydney, Australia. The interview will be conducted in Arabic language. My supervisors are Professor Lin Perry Lin.Perry@uts.edu.au and Dr Leila Gholizadeh Leila.Gholizadeh@uts.edu.au</p> <p>WHAT IS THIS RESEARCH ABOUT? This research is to find out about your experience of looking after your heart health. We want to find out about how you perceive and practice self-care in relation to your heart problem; what cultural beliefs and values shape what you do to take care of yourself and what factors help or present barriers to you for this.</p> <p>WHAT ARE THE TYPES OF QUESTIONS THAT WILL BE ASKED IN THE INTERVIEW? <u>We would like to ask you questions relating to your experience of heart disease and how you take care of yourself and your heart health: how you regard self-care and what you do in relation to your heart condition and what that means to you; what cultural beliefs</u></p>	<p>ورقة معلومات المشارك (PIS) العوامل المؤثرة على الالتزام بالرعاية الذاتية لدى مرضى قصور القلب في المملكة العربية السعودية رقم تسجيل: HREC Approval No. ETH21-6435</p> <p>من يقوم بالبحث؟ اسم حمده فايد الشمري وأنا طالبة في جامعة سيدني للتكنولوجيا - أستراليا. سلاتم إجراء المقابلة - اللغة العربية. الم # قون ع هم ل و ق س و ر ل و ن ي Lin.Perry@uts.edu.au والدكتورة ل و غ و ل و ن ا د ه Leila.Gholizadeh@uts.edu.au</p> <p>عن ماذا يدور هذا البحث؟ يهدف هذا البحث إلى التعرف على تجاربك في العناية - صحة قلبك. نريد معرفة كيفية إدراكك وممارستك للرعاية الذاتية فيما يتعلق - مشقة قلبك؛ ما هي المعتقدات والقيم الثقافية التي تؤثر على ما تفعله لتعريف نفسك وما هي العوامل التي تساعد أو تعيق حواجز أمامك من أجل ذلك. ماهي طبيعة الأسئلة التي سيتم طرحها في المقابلة؟ نود أن نطرح عليك أسئلة تتعلق بتجربتك مع مرض القلب وكيف تعين نفسك وصحة قلبك: كيف تنظر إلى الرعاية الذاتية وماذا تفعل فيما يتعلق - حالة قلبك وماذا تعني ذلك - الصحة لك؛ ما هي المعتقدات والقيم الثقافية التي تؤثر على ممارسات الرعاية الذاتية الخاصة بك وما الذي يساعدك أو يعيقك في الرعاية الذاتية</p> <p>لماذا تم سؤالني؟ تمت دعوتك للمشاركة في هذه الدراسة لأنك تذهب إلى عيادة وتتلقى العلاج في مستشفى الملك عبد العزيز التخصص</p>
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and values shape your self-care practices and what helps or hinders you in your self-care

WHY HAVE I BEEN ASKED?

You have been invited to participate in this study because you attend a clinic and are being treated at King Abdelaziz Specialist Hospital (KASH)

Your contact details were obtained from the Hospital admission centre

IF I SAY YES, WHAT WILL IT INVOLVE?

If you decide to participate, I will invite you to take part in a 30–45-minute semi-structured interview that will be audio recorded and transcribed and translated into English.

ARE THERE ANY RISKS/INCONVENIENCE?

Yes, there are some possible risks or inconveniences. There are no serious adverse events anticipated although it is possible that talking about health problems will result in some feelings of upset or distress.

If you want to stop at any time during the interview, you are free to do so. The researcher will be sensitive to the potential for distress and, if alerted to this, will pause the interview and consult you on your preferred action.

DO I HAVE TO SAY YES?

Participation in this study is voluntary. It is completely up to you whether or not you decide to take part.

تم الحصول على تفاصيل الاتصال الخاصة بك من مركز القبول - المستشفى

إذا قلت نعم، ماذا سيتضمن ذلك؟

إذا قررت المشاركة، سأدعوك للمشاركة في مقابلة نصف منظمة مدتها 30-45 دقيقة سلاتم تسجيلها صوتيًا ونسخها وترجمتها إلى اللغة الإنجليزية.

هل توجد أية مخاطر / عدم ارتياح؟

نعم، هناك بعض المخاطر أو المضاعفات المحتملة. لا توجد أحداث سلبيّة متوقعة على الرغم من أنه من الممكن أن يؤدي الحدث عن المشاعر الصحيّة إلى بعض الشعور بالضيق أو الضيق.

إذا كنت تريد التوقف في أي وقت أثناء المقابلة، فأنت حر في القيام بذلك. ستكون الباحث حساسًا لاحتمال حدوث ضائقة، وإذا تم تبينه لذلك، فسوف نقوم بتوقيف المقابلة مؤقتًا والتشاور معك بشأن الإجراءات المفضّل لديك.

هل يجب أن أقول نعم؟

المشاركة في هذه الدراسة طوعية. الأمر متروك لك تمامًا سواء قررت المشاركة أم لا.

ماذا سيحدث إذا قلت لا؟

إذا قررت عدم المشاركة، فلن يؤثر ذلك على علاجك أو علاقتك -المستشفى أو طاقم المستشفى. إذا كنت ترغب في الانسحاب من الدراسة -مجرد دئها، فستتمكن القيام بذلك في أي وقت حثّ عندما نجعل المعلومات مجهولة عن طاقم حذف بياناتك، عن طاقم الاتصال -الباحث. لا داعي لإعطاء بقب. إذا انسحبت من الدراسة، فستتم مسح سجلات الدراسة الخاصة بك وستتم إتلاف نصوص مقالماتك

أمة

من خلال التوقيع على نموذج الموافقة، فإنك توافق على قيام فريق البحث بجمع واستخدام المعلومات الشخصية عنك لم# 'وع البحث. سلاتم التعامل مع«ل هذه

WHAT WILL HAPPEN IF I SAY NO?

If you decide not to participate, it will not affect your treatment or your relationship with the hospital or hospital staff. If you wish to withdraw from the study once it has started, you can do so at any time up until when we make the information anonymous by deleting your details, by contacting the researchers. You do not have to give a reason. If you withdraw from the study, your study records will be erased and the transcripts of your interview will be destroyed. However, it may not be possible to withdraw your data from the study results if these have already had your identifying details removed.

CONFIDENTIALITY

By signing the consent form, you consent to the research team collecting and using personal information about you for the research project. All this information will be treated confidentially. It will be kept in a locked cabinet or in password-protected electronic systems and only the researchers will have access to it. Your information will only be used for the purpose of this research project and it will only be disclosed with your permission, except as required by law. We plan to discuss and publish the results. In any publication, information will be provided in such a way that you cannot be identified.

المعلومات W آمنة تامة. سلاتم الاحتفاظ بها في خزانة مقفلة أو في أنظمة الإلكترونية محمية كلمة مرور و سلاتمكن الباحثون فقط من الوصول إليها. سلاتم استخدام معلوماتك فقط لغرض هذا الم # 'وع البحث ولن يتم الكشف عنها إلا بإذن منك ، - استثناء ما يقتضيه القانون. نحن نخطط لمناقشة # ' النتائج. في أي مرسوم ، سلاتم توفير المعلومات - طابقة لا يمكن تحديد هاتك.

ماذا لو كان لدي مخاوف أو شكوى؟

إذا «انت لديك مخاوف W بشأن البحث الذي تعتقد أنه مكلف مساعدتك فيه ، فلا تد في الاتصال A ع 966539200907+ - قد يتم الاتصال بك مرة أخرى في المستقبل للمشاركة في استطلاع - سيتم إعطاؤك نسخة من هذا النموذج للاحتفاظ بها.

ملاحظة:

تمت الموافقة ع هذه الدراسة - ما يتم # _ مع المهدي التوجيهية للجنة أخلاقيات البحث # 10 في - جامعة س في للتكنولوجيا [UTS HREC]. إذا «انت لديك آفة مخاوف أو شواوي حول أي جانب من جوانب إجراء هذا البحث ، في الاتصال - أمانة الأخلاقيات ع رقم الهاتف: +61 2 9514 2478 أو في الإلهة A:

Research.Ethics@uts.edu.au واقس مرجع UTS HREC عدد. سلاتم التعامل مع أي مسألة يتم طرحها W آفة ، والتحقيق فيها ، و سلاتم [إلغك - النتيجة].

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

If you have concerns about the research that you think I can help you with, please feel free to contact me on [REDACTED]

- You might be contacted again in the future to take part in a survey
- You will be given a copy of this form to keep.

NOTE:

This study has been approved in line with the University of Technology Sydney Human Research Ethics Committee [UTS HREC] guidelines. If you have any concerns or complaints about any aspect of the conduct of this research, please contact the Ethics Secretariat on ph.: +61 2 9514 2478 or email: Research.Ethics@uts.edu.au] and quote the UTS HREC reference number. Any matter raised will be treated confidentially, investigated and you will be informed of the outcome.

Appendix 23: Participant Information Statement Phase Two

<p>PARTICIPANT INFORMATION SHEET (PIS) Factors affecting self-care adherence in patients with heart failure in Saudi Arabia HREC registration number: HREC Approval No. ETH21-6435</p> <p>WHO IS DOING THE RESEARCH? My name is Hamdah Faied Alshammari and I am a student at University of Technology Sydney, Australia. The survey will be conducted in Arabic language. My supervisors are Professor Lin Perry Lin.Perry@uts.edu.au and Dr Leila Gholizadeh Leila.Gholizadeh@uts.edu.au</p> <p>WHAT IS THIS RESEARCH ABOUT? This research is to find out about your experience of looking after your heart health. We want to find out about how you perceive and practice self-care in relation to your heart problem; what cultural beliefs and values shape what you do to take care of yourself and what factors help or present barriers to you for this.</p> <p>WHAT ARE THE KINDS OF QUESTIONS THAT WILL BE ASKED IN THE SURVEY? <i>We would like to ask you questions relating to your experience of heart disease and how you take care of yourself and your heart health:</i> <i>This survey has six parts:</i></p>	<p>ورقة معلومات المشارك (PIS) العوامل المؤثرة على الالتزام بالرعاية الذاتية لدى مرضى قصور القلب في المملكة العربية السعودية رقم تسجيل: HREC Approval No. ETH21-6435</p> <p>من يقوم بالبحث؟ اسمع حمده فاعد الشمري وأنا طالبة في جامعة سوليداف للتكنولوجيا أسستنا. سلاتم إجراء الاستطلاع اللغة العربية. الم # قون ع ه هم لونا وفسور ل ه لوني Lin.Perry@uts.edu.au والدكتورة ل غوليزاده Leila.Gholizadeh@uts.edu.au</p> <p>عن ماذا يدور هذا البحث؟ يهدف هذا البحث إلى التعرف على تجاربك في العناية بصحة قلبك. نريد معرفة كيفية إدراكك وممارستك للرعاية الذاتية فيما يتعلق بمشكلة قلبك؛ ما هي المعتقدات والقيم الثقافية التي تؤثر ما تفعله لتعفي نفسك وما هي العوامل التي تساعد أو تعيق حواجز أمامك من أجل ذلك.</p> <p>ما طبيعته الأسئلة التي سيتم طرحها في الاستبيان؟ <u>نود أن نطرح عليك أسئلة تتعلق بتجربتك مع مرض القلب وكيف تعفي نفسك وبصحة قلبك: يتكون هذا الاستطلاع من ستة أجزاء</u></p> <ul style="list-style-type: none"> • <u>الجزء الأول: بعض الأسئلة عن وظائفك المعرفية</u> • <u>الجزء الثاني: بعض الأسئلة عنك وعن صحة قلبك</u> • <u>الجزء الثالث: بعض الأسئلة عن الأشياء التي تعملها للمحافظة على صحة قلبك</u>
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<ul style="list-style-type: none"> • Part 1: Some questions that test your thinking skills • Part 2: Some questions about you and your heart health • Part 3: Some questions about the things that you do to keep your heart healthy. • Part 4: Some questions about what you understand of your heart disease. • Part 5: Some questions about your family and friends • Part 6: Some questions about your mental health 	<ul style="list-style-type: none"> • <u>الجزء الرابع: بعض الأسئلة عن مدى فهمك لمرض القلب</u> • <u>الجزء الخامس: بعض الأسئلة عن الدعم الاجتماعي الخاص بك</u> • <u>الجزء السادس: بعض الأسئلة عما تشعر به في نفسك</u> <p>لماذا تم سؤالي؟</p> <p>تمت دعوتك للمشاركة في هذه الدراسة لأنك تذهب إلى عيادة وتتلقى العلاج في مستشفى الملك عهد العزيز التخصصي.</p> <p>تم الحصول على تفاصيل الاتصال الخاصة بك من مركز القبول - المستشفى.</p> <p>إذا قلت نعم، ماذا سيتضمن ذلك؟</p> <p>إذا قررت المشاركة، سأدعوك لإكمال استبيان سيستغرق حوالي 30 دقيقة</p>
<p>WHY HAVE I BEEN ASKED?</p> <p>You have been invited to participate in this study because you attend a clinic and are being treated at King Abdelaziz Specialist Hospital (KASH)</p> <p>Your contact details were obtained from the Hospital admission centre</p>	<p>هل توجد أية مخاطر / عدم ارتياح؟</p> <p>نعم ، هناك بعض المخاطر أو المضاعفات المحتملة. لا توجد أحداث سلبيّة متوقعة على الرغم من أنه من الممكن أن يؤدي الحدث عن المشلل الصحيّة إلى بعض الشعور - الضيق أو الضيق.</p> <p>سيكون الباحث حساسًا لاحتمال حدوث ضائقة ، وإذا تم تمييزه لذلك ، فسوف نقوم بإيقاف المقابلة مؤقتًا والمشاور معك بشأن الإجراء المفضل لديك.</p>
<p>IF I SAY YES, WHAT WILL IT INVOLVE?</p> <p>If you decide to participate, I will invite you to complete a questionnaire that will take approximately 30 minutes</p>	<p>هل يجب أن أقول نعم؟</p> <p>المشاركة في هذه الدراسة طوعية. الأمر متروك لك تمامًا سواء قررت المشاركة أم لا.</p>
<p>ARE THERE ANY RISKS/INCONVENIENCE?</p> <p>Yes, there are some possible risks or inconveniences. There are no serious adverse events anticipated although it is possible that</p>	<p>ماذا سيحدث إذا قلت لا؟</p> <p>إذا قررت عدم المشاركة ، فلن يؤثر ذلك على علاجك أو علاقتك - المستشفى أو طاقم المستشفى. إذا كنت ترغب في الانسحاب من الدراسة - مجرد دئها ، فممكنك القيام بذلك في أي وقت حثّة عندما نجعل المعلومات مجهولة</p>

talking about health problems will result in some feelings of upset or distress.

The researcher will be sensitive to the potential for distress and, if alerted to this, will pause the interview and consult you on your preferred action.

DO I HAVE TO SAY YES?

Participation in this study is voluntary. It is completely up to you whether or not you decide to take part.

WHAT WILL HAPPEN IF I SAY NO?

If you decide not to participate, it will not affect your treatment or your relationship with the hospital or hospital staff. If you wish to withdraw from the study once it has started, you can do so at any time up until when we make the information anonymous by deleting your details, by contacting the researchers. You do not have to give a reason. If you withdraw from the study, your study records will be erased, and your survey responses will be destroyed. However, it may not be possible to withdraw your data from the study results if these have already had your identifying details removed.

CONFIDENTIALITY

By signing the consent form, you consent to the research team collecting and using personal information about you for the research project. All this information will be

عن طريق حذف بياناتك ، عن طريق الاتصال بالباحثين. لا داعي لإعطاء لقب. إذا تم سحب من الدراسة ، فسيتم مسح سجلات الدراسة الخاصة بك وسلامتك إتلاف إجاباتك عن الأسئلة.

السرية:

من خلال التوقيع عن نموذج الموافقة ، فإنك توافق عن قيام فريق البحث بجمع واستخدام المعلومات الشخصية عنك لم # 'وع البحث. سيتم التعامل مع «ل هذه المعلومات W أة تامة. سيتم الاحتفاظ بها في خزانة مقفلة أو في أنظمة الإلكترونية محكمة - كلمة مرور وسلامتك الباحثون فقط من الوصول إليها. سيتم استخدام معلوماتك فقط لغرض هذا الم # 'وع البحث ، ولن يتم الكشف عنها إلا بإذن منك ، - استثناء ما تقتضيه القانون.

نحن نخطط لمناقشة # ' النتائج في أي مرسوم ، سيتم توفير المعلومات - طابقة لا يمكن تحديد هاتك.

ماذا لو كان لدي مخاوف أو شكوى؟

إذا «انت لديك مخاوف بشأن البحث الذي تعتقد أنه

مكلف مساعدتك فيه ، فلا تدع الاتصال بـ A

966539200907+

سيتم إعطاؤك نسخة من هذا النموذج للاحتفاظ بها.

ملاحظة:

تمت الموافقة عن هذه الدراسة - ما يتم # _ مع المهدي

التوجيهية للجنة أخلاقيات البحث # _ ي - جامعة

سنة A للتكنولوجيا [UTS HREC] إذا «انت لديك أة

مخاوف أو شواوي حول أي جانب من جوانب إجراء هذا

البحث ، في ؛ الاتصال - أمانة الأخلاقيات عن رقم

الهاتف: +61 2 9514 2478 أو في الإلهة A :

[Research.Ethics@uts.edu.au] واثق س مرجع

<p>treated confidentially. It will be kept in a locked cabinet or in password-protected electronic systems and only the researchers will have access to it. Your information will only be used for the purpose of this research project, and it will only be disclosed with your permission, except as required by law.</p> <p>We plan to discuss and publish the results. In any publication, information will be provided in such a way that you cannot be identified.</p> <p>WHAT IF I HAVE CONCERNS OR A COMPLAINT?</p> <p>If you have concerns about the research that you think I can help you with, please feel free to contact me on [REDACTED]</p> <p>You will be given a copy of this form to keep.</p> <p>NOTE:</p> <p>This study has been approved in line with the University of Technology Sydney Human Research Ethics Committee [UTS HREC] guidelines. If you have any concerns or complaints about any aspect of the conduct of this research, please contact the Ethics Secretariat on ph.: +61 2 9514 2478 or email: Research.Ethics@uts.edu.au] and quote the UTS HREC reference number. Any matter raised will be treated confidentially, investigated and you will be informed of the outcome.</p>	<p>UTS HREC عدد. سلاتم التعامل مع أي مسألة يتم طرحها أو أية ، والتحقيق فيها ، وسلاتم إلغائك النتيجة.</p>
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Appendix 24: Informed Consent Form

<p style="text-align: center;">CONSENT FORM</p> <p style="text-align: center;">Factors affecting self-care adherence in patients with heart failure in Saudi Arabia HREC registration number: HREC Approval No. ETH21-6435</p> <p>I _____ [participant's name] agree to participate in the research project Factors affecting self-care adherence in patients with heart failure in Saudi Arabia being conducted by Hamdah Alshammari.</p> <p>I have read the Participant Information Sheet or someone has read it to me in a language that I understand.</p> <p>I understand the purposes, procedures and risks of the research as described in the Participant Information Sheet.</p> <p>I have had an opportunity to ask questions and I am satisfied with the answers I have received.</p> <p>I freely agree to participate in this research project as described and understand that I am free to withdraw at any time without affecting my relationship with the researchers or the University of Technology Sydney.</p> <p>I understand that I will be given a signed copy of this document to keep.</p> <p>I agree to be:</p> <p><input type="checkbox"/> Audio recorded</p> <p>I agree that the research data gathered from this project may be published in a form that:</p> <p><input type="checkbox"/> Does not identify me in any way</p>	<p style="text-align: center;">نموذج الموافقة</p> <p style="text-align: center;">العوامل المؤثرة على الالتزام بالرعاية الذاتية لدى مرضى قصور القلب في المملكة العربية السعودية رقم تسجيل: HREC Approval No. ETH21- 6435</p> <p>أنا _____ [اسم المشارك] أوافق على المشاركة في مشروع بحث العوامل المؤثرة على الالتزام بالرعاية الذاتية لدى مرضى قصور القلب في المملكة العربية السعودية الذي أجرته حمدة الشمري.</p> <p>لقد قرأت ورقة معلومات المشارك أو قرأها لي أحدهم بلغة أفهمها.</p> <p>أفهم أغراض وإجراءات ومخاطر البحث «ما هو موضح في ورقة معلومات المشارك».</p> <p>لقد أتحقت في الفرصة لطرح الأسئلة وأنا راضٍ عن الإجابات التي تلقيتها.</p> <p>أوافق - حياءً على المشاركة في هذا المشروع «ما هو موصوف وأدرك أفهم» حرراً الانسحاب في أي وقت دون التأثير على علاقتي بالباحث أو جامعة سئلف للتكنولوجيا.</p> <p>أفهم أنه سلاتم إعطائي نسخة موقعة من هذا المسند للاحتفاظ بها.</p> <p>أوافق على أن أكون: <input type="checkbox"/> مسجل صوتي</p> <p>أوافق على أن البيانات البحثية التي تم جمعها من هذا المشروع يمكن أن تكون لها - الشغل التالي: <input type="checkbox"/> لا تعرف أي شغل من الأشغال</p> <p>أنا حمدة الشمري إذا «ان أدرك أنه مكيف الاتصال بـ لدي أي مخاوف بشأن البحث»</p>
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<p>I am aware that I can contact Hamdah Alshammari if I have any concerns about the research.</p> <hr/> <p>____/____/____ Name and Signature [participant] Date</p> <hr/> <p>____/____/____ Name and Signature [researcher or delegate] Date</p> <hr/> <p>____/____/____ Name and Signature [witness*] Date</p>	<hr/> <p>____/____/____ الاسم والتوقيع [المشارك] التأخير</p> <hr/> <p>____/____/____ الاسم والتوقيع [الباحث أو المفوض] التأخير</p> <hr/> <p>____/____/____ الاسم والتوقيع [الشاهد*] التأخير</p>
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Appendix 25: Descriptive Statistics for the Self-care Maintenance Subscale (n=205)

	Never n (%)	Sometimes n (%)	Frequently n (%)	Always n (%)
Daily weighing	59 (28.8)	90 (43.9)	50 (24.4)	6 (2.9)
Checking ankles for swelling	53 (25.9)	61 (29.8)	60 (29.3)	31 (15.1)
Trying to avoid getting sick	47 (22.9)	49 (23.9)	59 (28.8)	50 (24.4)
Becoming engaged in physical activity	38 (18.5)	73 (35.6)	57 (27.8)	37 (18)
Keeping doctor or nurse appointments	5 (2.4)	20 (9.8)	66 (32.2)	114 (55.6)
Adhering to a low salt diet	27 (13.2)	81 (39.5)	55 (26.8)	42 (20.5)
Exercising for at least 30 minutes daily	62 (30.2)	69 (33.7)	48 (23.4)	26 (12.7)
Forgetting to take your medicines	91 (44.4)	81 (39.5)	30 (14.6)	3 (1.5)
Asking for low salt items when eating out or visiting others	108 (52.7)	65(31.7)	24 (11.7)	8 (3.9)
Using a system, such as pill box reminders to help you remember your medicines?	56 (27.3)	47 (22.9)	52 (25.4)	50 (24.4)

Appendix 26: Descriptive Statistics for the Self-care Management Subscale (n=205)

	I did not recognise it n (%)	Not quickly n (%)	Somewhat quickly n (%)	Quickly n (%)	Very quickly n (%)
Reducing as a symptom of heart failure	18 (8.8)	49 (23.9)	74 (36.1)	52 (25.4)	12 (5.9)
	Not likely n (%)	Somewhat likely n (%)	Likely n (%)	Very likely n (%)	
Reducing the salt in diet	62 (30.3)	56 (27.3)	61 (29.8)	26 (12.7)	
Reducing your fluid intake	90 (43.9)	56 (27.3)	39 (19.0)	20 (9.8)	
Taking an extra water pill	45 (22)	42 (20.5)	62 (30.2)	56 (27.3)	
Calling doctor or nurse for guidance	41 (20.0)	30 (14.6)	71 (34.7)	63 (30.7)	
	I did not try anything n (%)	Not sure n (%)	Somewhat sure n (%)	Sure n (%)	Very sure n (%)
Being sure the remedy helped or did not help	41 (20.0)	36 (17.6)	77 (37.6)	41 (20.0)	10 (4.9)

Appendix 27: Descriptive Statistics for the Self-care Confidence Subscale
(n=205)

	Not confident n (%)	Somewhat confident n (%)	Very confident n (%)	Extremely confident n (%)
Confidence in keeping free from heart failure symptoms	44 (21.5)	91(44.4)	57 (27.8)	13 (6.3)
Following the treatment advice	12 (5.9)	74 (36.1)	67 (32.7)	52 (25.4)
Confidence in evaluating the importance of symptoms	22 (10.7)	72 (35.1)	72 (35.1)	39 (19.0)
Confidence in recognise changes in health when they occur?	15 (7.3)	64 (31.2)	81 (39.5)	45 (22.0)
Confidence in doing something to relieve symptoms?	21 (10.2)	89 (43.4)	56 (27.3)	39 (19.0)
Confidence in evaluating the effectiveness of a remedy?	7 (3.4)	61 (29.8)	69 (33.7)	68 (33.2)

Appendix 28: Correlations Between Independent Variables

DHFKS	Current	Employme	Perceived	Education	living	Marital	Gender	Age	
-.150*	-.242**	.335**	.040	-.546**	.035	-.106	-.035	1	Age
-.078	-.347**	.301**	-.169*	-.236**	.188**	-.250**	1		gender
.228**	.017	-.074	.023	.186**	-.750**	1			Marital status
-.231**	-.006	.082	.097	-.165*	1				living circumstances
.307**	.222**	-.348**	.214**	1					Education
.160*	.085	-.038	1						Income
-.069	-.285**	1							Employment status
.013	1								Current smoking
1									DHFKS
									NYHA class
									CCI
									MINI-COG
									HF duration
									Hospital admission
									Number medications
									MARS-5
									HADS depression
									HADS anxiety score
									MSPSS total score
									Family caregivers
									Paid caregivers
									The most common
									Chief motivation for
									Participants'
									Having other health
									Clear advice on how
									Comfortable with
									Availability of time

Availability	Comfortable	Clear	Having other health	Participants'	Chief	The most common	Having
.324**	.130	.144*	.135	-.386**	.097	-.380**	.163*
-.007	.025	-.027	.172*	-.032	.025	-.165*	.064
-.137	-.118	.141*	.003	.141*	.002	.285**	-.218**
.033	.041	-.050	.056	-.212**	.029	-.241**	.200**
-.101	-.099	-.130	-.098	.482**	-.109	.304**	-.158*
.128	-.044	-.006	-.122	.113	-.101	.048	.036
.068	.074	.049	.044	-.065	.010	-.144*	.031
-.127	-.048	-.133	-.114	-.004	.081	.165*	-.099
-.087	-.157*	.070	-.052	.202**	-.077	.199**	-.146*
.024	.001	.037	.102	-.119	.000	-.189**	.043
.220**	.108	.152*	.191**	-.234**	.084	-.266**	.134
-.022	-.089	-.050	-.182**	.271**	-.091	.237**	-.013
.072	.106	.054	.179*	-.217**	.119	-.287**	.075
-.043	.097	.105	.143*	-.261**	.024	-.182**	.124
.108	.136	.057	.065	-.017	.062	-.158*	-.014
.216**	-.267**	.191**	.019	.118	-.060	.020	-.046
-.114	.258**	-.085	.163*	-.187**	.135	-.295**	.145*
-.139*	.215**	-.079	.203**	-.122	.076	-.250**	-.007
-.003	-.180**	.138*	-.043	.149*	.147*	.164*	-.021
.238**	.150*	.057	.242**	-.342**	.103	-.406**	.236**
.063	.046	-.127	.021	-.097	-.008	-.181**	1
-.062	-.243**	.066	-.209**	.320**	-.165*	1	
.014	.213**	-.058	.017	-.056	1		
-.023	-.083	-.008	-.128	1			
-.096	.204**	.037	1				
.018	-.244**	1					
-.107	1						
1							

Appendix 29: Triangulation and Integration of Study Findings

Interview	Survey	Convergence Decision
<ul style="list-style-type: none"> Participants reported a range of physical symptoms and limitations caused by HF, such as fatigue, shortness of breath, swelling of extremities, decreased physical endurance, sleep disturbance and sexual changes. 	<ul style="list-style-type: none"> Few participants (only 1%) had no trouble breathing or with ankle swelling in the past month. The NYHA classification in the current sample was consistent with their physical symptoms and limitations as around 42.0% were classified at NYHA class II, around 11.7% at NYHA class III and 0.5 % at NYHA class IV. Higher NYHA class was linked with statistically significantly better self-care confidence ($p = 0.011$). 	Partial agreement: Interview & survey findings reported a similar range of symptoms, but each reported at higher prevalence in survey data.
<ul style="list-style-type: none"> Many expressed feelings of depression, anger, decreased motivation, anxiety, sadness, stress, changes in body image, low self-esteem, denial and fear associated with their condition and its progression Depression emerged as a substantial impediment to the pursuit of adequate self-care. Participants described they used various strategies to reduce stress, such as engaging in relaxation techniques, seeking social support, and avoiding stressful situations and arguments. 	<ul style="list-style-type: none"> HADS depression: half the participants (50.2%) scored in the depression category. In terms of anxiety, a quarter of participants (24.4%) were classified as experiencing anxious symptoms. Having depression or anxiety: HADS scores were not statistically significantly associated with self-care maintenance or confidence. However, participants with moderate to severe symptoms of anxiety and depression tended to have inadequate self-care maintenance and confidence. 	Partial agreement: Interviews and the survey findings reported psychological distress such as depression and anxiety; but the severity of symptoms was greater in the interviews and had an impact on patients' lives and self-care, whereas this impact was not clearly evident in the survey.
<ul style="list-style-type: none"> Many experienced social isolation due to their physical limitations and the need to avoid situations that might exacerbate their symptoms. 	<ul style="list-style-type: none"> High social support among 80% of participants, with the MSPSS 'Family' section scoring highest, followed by MSPSS 'Significant other', then MSPSS 'Friend' scores. Social support scored as MSPSS did not show 	Partial agreement: Interviews and survey findings reported the presence of social support and highlighted the role of family in self-care among heart failure patients. While both data sources underscore the importance of family, the

<ul style="list-style-type: none"> • Social and family activities and interactions were reduced. • Participants praised the role of family in facilitating self-care and providing psychological support. However, family could also act as a barrier to self-care when they were not involved in HF management practices, which placed a burden on the participant. In addition, some of the actions of their families that participants reported and considered crucial and helpful were actually harmful. 	<p>statistically significant association with self-care maintenance and confidence. However, participants who had inadequate social support tended to have inadequate self-care maintenance and confidence.</p> <ul style="list-style-type: none"> • Marital status was not statistically significantly associated with self-care maintenance. However, single participants tended to have inadequate self-care maintenance. • Marital status: married (74.4%). • Having family or paid caregivers was not statistically significantly associated with self-care maintenance or management. However, participants who did not have family or paid caregivers tended to have inadequate self-care maintenance. Participants who did not have family caregivers tended to have inadequate self-care management. 	<p>interviews revealed a deeper and more nuanced impact, including both supportive and potentially harmful aspects of family involvement—elements not captured in the survey. Although the survey indicated high levels of social support, it did not show a statistically significant association between social support and self-care. In contrast, interview participants described a clear influence of family—either facilitating or hindering self-care. This discrepancy suggests that quantitative tools may not fully capture the complexity of family dynamics and their real-life impact on patients’ self-care behaviours.</p>
<ul style="list-style-type: none"> • Participants reported often turning to their faith, focusing on finding new meaning in life and redefining personal goals, for comfort and strength. • Many participants believed in fatalism and relied on God’s will regarding their health. This belief affected their self-care practices both positively and negatively. 	<ul style="list-style-type: none"> • All participants identified as Muslim; therefore, the role of religion in self-care could not be examined statistically. 	<ul style="list-style-type: none"> • Silent: the role of religion in self-care could not be examined statistically. In survey.
<ul style="list-style-type: none"> • Physical and psychological limitations imposed by the condition made it difficult to maintain a full-time job or pursue career advancement. 	<ul style="list-style-type: none"> • Around 42.9% of participants were retired, 12.6% of whom had retired at under 60 years (the official retirement age in Saudi Arabia). 	<p>Partial agreement: Interview and survey findings point to the impact of HF on employment; but the survey did not explore the reasons for retirement, so it is unclear whether early retirement was directly due to HF.</p>

<ul style="list-style-type: none"> Participants appreciated the importance of taking HF medications regularly, However, some participants failed to adhere to their medication regimens. Some participants appeared to lack clear understanding of medication adherence. Participants who did not experience side effects of their medications continued on their medications. However, a number of participants complained of some of the side effects of the medications, which could be a barrier to them adhering to the medications. 	<ul style="list-style-type: none"> SCHFI- 16.1% of participants reported that they forgot to take their medicines frequently or always. SCHFI- around half of participants responded using systems like pill box reminders to remember medicines frequently or always. A statistically substantial impact was observed in the number of medications taken per day, where increased numbers of medications were significantly associated with decreased self-care confidence. MARS-5 scores, 37.1% scored ≥ 20, indicating good adherence, while 62.9% scored < 20, indicating non-adherence. Medications adherence as MARS-5 scores did not show statistically significant association with self-care maintenance and confidence in the multiple regression analysis. However, participants with inadequate adherence to medication tended to have insufficient self-care maintenance and lower confidence. 	<ul style="list-style-type: none"> Partial agreement: Interview and survey findings highlight issues with medication adherence among patients with HF. Interviews revealed that while participants valued the importance of taking medications, some lacked understanding of adherence and were affected by side effects, which acted as a barrier. The survey data supported this with quantitative evidence: 62.9% of participants had poor adherence based on MARS-5 scores, and 16.1% frequently or always forgot their medications. Additionally, about half of the participants used reminder systems, indicating awareness and effort toward adherence. Moreover, although poor adherence was associated with lower self-care maintenance and confidence, this was not statistically significant in the regression analysis. Therefore, the findings partially agree, with the interviews offering richer insights into the barriers behind the behaviours reported in the survey.
<ul style="list-style-type: none"> Participants stressed the importance of following doctors' advice and attending scheduled appointments to improve their health, but some felt that this advice was exaggerated, which may lead to a degree of distrust in some of their advice. 	<ul style="list-style-type: none"> Being comfortable discussing their disease with healthcare providers was influential, revealing statistically positive associations with self-care management but not self-care maintenance or self-care confidence when compared to individuals who typically did not engage in discussions with healthcare providers or did not feel comfortable doing this. Those who were comfortable discussing their disease with healthcare professionals tended to have adequate self-care maintenance and confidence Health care providers' support, such as receiving clear advice from their 	<p>Partial agreement: Interview and survey findings emphasize the importance of healthcare provider interactions in supporting self-care among patients with HF. Both sources confirm that communication and appointments are important, but interviews reveal a more complex picture, including scepticism about medical advice, which was not captured in the quantitative data. The survey measured presence and comfort in communication, but not perceptions of credibility or trust, which were central to the interview findings.</p>

	<p>doctor or nurse, did not show statistically significant association with self-care maintenance, management or confidence.</p> <ul style="list-style-type: none"> SCHFI- 87.8% of participants reported that they keep their doctor or nurse appointments frequently or always. 	
<ul style="list-style-type: none"> Many participants believed that dietary modifications were a critical component of HF self-care. Some spoke of adopting healthier diets, such as reducing sodium intake and avoiding foods high in saturated fats. However, many struggled with adhering to a healthy diet. Cultural dietary preference, limited access to low-sodium foods, and a lack of knowledge about sodium content in foods contributed to this challenge. Participants avoided attending social events where dietary choices might be challenging. 	<ul style="list-style-type: none"> SCHFI- Only about 50% of participants adhered to a low-salt diet. SCHFI- Only about 50% knew how much fluid they should drink each day at home SCHFI- 52.7% of participants never asked for low-salt items when dining out, while 31.7% did so only sometimes when visiting others. Most participants reported that they "never" or only "sometimes" asked for low-salt items when dining out or visiting others as this was considered culturally inappropriate, and incompatible with hospitality and guest etiquette. 	<p>Agreement: Interviews and surveys confirm that diet is a key part of HF self-care but difficult to maintain. Interviews noted efforts to reduce salt and unhealthy foods, but barriers like cultural preferences, limited access, and low awareness. Surveys showed only ~50% followed a low-salt diet, and most rarely requested low-salt options due to cultural norms. This consistent evidence confirms agreement on diet challenges in HF self-care.</p>
<ul style="list-style-type: none"> Participants reported exercising as self-care practice. 	<ul style="list-style-type: none"> SCHFI- around half of the participants reported that they engaged in physical activity or exercised frequently or always. Participants' responses indicate that the most common types of physical activity are walking outdoors alone (32.2%) and with friends or family (31.2%), while a significant portion do not exercise at all (34.1%), and using exercise equipment is the least common activity (2.4%). Participants with HF who engaged in physical activity compared to no exercise were statistically associated 	<p>Agreement: Interviews and surveys emphasize the importance of physical activity as a self-care practice for heart failure patients. Both show that many participants exercise, mainly by walking. The survey found that about half of the participants exercise regularly, and those who do have significantly better self-care maintenance ($p < 0.001$). This consistent evidence confirms the key role of physical activity in self-care.</p>

	with a substantial increase in self-care maintenance ($p < 0.001$), but not self-care management or confidence. This factor was the only one that was significantly associated with self-care maintenance.	
<ul style="list-style-type: none"> Lack of adherence to daily weight checking emerged as self-care deficit. 	<ul style="list-style-type: none"> Most participants were unable to provide valid responses to questions: how often should they weigh themselves? Why is it important that they should weigh themselves regularly? SCHFI- weighing themselves: 28.8% of participants never did so, 68.3% did so sometimes or frequently, and only 2.9% always weighed themselves. 	Agreement: interviews and surveys agree that daily weight monitoring is a major self-care problem for heart failure patients. Interviews show poor adherence, and surveys reveal most don't know how often or why to weigh themselves. Only 2.9% always weigh themselves, while 28.8% never do. This confirms daily weight checking is a key self-care deficit.
	<ul style="list-style-type: none"> SCHFI- 25.9% of participants never checked their ankles for swelling, 59.1% did so sometimes or frequently, and only 15.1% always checked. 	Silent: Only the survey addressed ankle swelling checks.
	<ul style="list-style-type: none"> Most participants were unable to provide valid responses to questions such as: How much fluid should they drink at home each day? 	Silent: Only the survey addressed participants' ability to provide valid responses about daily fluid intake.
	<ul style="list-style-type: none"> SCHFI- around half of participants responded that they tried to avoid getting sick frequently or always. 	Silent: Only the survey addressed participants' efforts to avoid getting sick, with some reporting they did so frequently or always.
<ul style="list-style-type: none"> Participants reported achieving a balance between work and rest as a self-care practice. 		Silent: Only the interviews addressed participants' efforts to balance work and rest as part of their self-care.
<ul style="list-style-type: none"> Participants acknowledged the importance of quitting smoking. However, some continued to smoke. 	<ul style="list-style-type: none"> Smoking was found to be not statistically significant associated with self-care maintenance. However, participants who currently smoked tended to have inadequate self-care maintenance. 24.4% of participants reported being current smokers, while 75.6% stated that they did not smoke. 	Partial agreement: Interviews and surveys similar findings. Interviews show participants recognize quitting smoking is important, but some still smoke. The survey found no significant link between smoking and self-care maintenance, though smokers tended to have poorer self-care. With 24.4% currently smoking, both sources highlight smoking's mixed impact on self-care.

<ul style="list-style-type: none"> Participants reported setting a good sleep routine as a self-care practice. 		<ul style="list-style-type: none"> Silent:
<ul style="list-style-type: none"> A gap in knowledge and its self-care was evident. 	<ul style="list-style-type: none"> Around 39.7 % of total participants were illiterate or had only primary education. Participant were unable to provide valid responses to questions about pathophysiology or recognise signs and symptoms of worsening disease. Level of education was not statistically significantly associated with self-care maintenance. However, participants with higher formal education tended to have less self-care maintenance. 	<p>Partial agreement: Interviews revealed gaps in knowledge and self-care, while the survey showed many participants had low education levels and struggled to recognize symptoms or answer questions. Although education level was not significantly linked to self-care maintenance, those with higher education surprisingly tended to have poorer self-care.</p>
<ul style="list-style-type: none"> Patients actively sought information about HF to better understand their condition and the necessary self-care practices and lifestyle changes. The depth and accuracy of their knowledge regarding self-care of HF varied. While some participants had a reasonable understanding of the disease, others had gaps in their knowledge. 	<ul style="list-style-type: none"> Median (IQR) DHFKS 9.0 (4.0), indicating a relatively good knowledge level. SCHFI-participants' recognition of HF exacerbation symptoms in the past month varied: 8.8% did not recognise the symptoms, 60% recognised them slowly, and only 31.3% recognised them quickly. SCHFI- participants' recognition of HF exacerbation symptoms in the past month varied: 8.8% did not recognise, 60% recognised them slowly, and only 31.3% quickly or very quickly. SCHFI- few participants were likely to take specific self-care actions, including reducing salt intake (30.3% not likely), reducing fluid intake (43.9% not likely), taking an extra water pill (22% not likely), and calling their healthcare provider for guidance (20% not likely). Participants expressed varying levels of certainty regarding the effectiveness of remedies, with 20.0% not sure and 17.6% not trying anything. 	<p>Partial agreement: Interviews showed patients actively sought HF information, but knowledge levels varied. Surveys supported this with DHFKS scores showing moderate knowledge, but only 30% quickly recognized symptoms, and many were unlikely to take appropriate self-care actions. Knowledge wasn't significantly linked to self-care outcomes, though low knowledge was linked to poorer self-care. This reflects partial agreement—both sources highlight varied knowledge, but with differing impacts on behaviour and outcomes.</p>

	<ul style="list-style-type: none"> • Only 30% were able to recognise the symptoms of HF exacerbation “quickly” or “very quickly” • HF knowledge was not statistically significantly associated with self-care maintenance and confidence. Participants with low level of knowledge tended to have inadequate self-care maintenance and confidence. • Shorter HF duration showed a statistically significant association with inadequate self-care management. • Higher number of hospital admissions in the previous year exhibited a statistically significant association with inadequate self-care confidence. 	
<ul style="list-style-type: none"> • Participants benefited from a collectivist culture, where there were significant family and social support around patients. However, when some were asked directly about the role of culture in self-care, they couldn’t relate self-care to culture. • importance of being a member of a group in all aspects of life within family or society rather than doing things by themselves. However, group influences could also make it difficult for any one individual to have something different, such as a low-salt diet, even if this was required for HF self-care. • As is typical of many Middle Eastern societies, the responsibility for cooking and preparing food rested with the female, and so most 	<ul style="list-style-type: none"> • Most participants reported that they "never" asked for low-salt items when dining out or visiting others as this was culturally inappropriate, and not compatible with hospitality and guest etiquette. 	<p>Agreement: Interviews and surveys highlight the strong influence of collectivist culture and social norms on self-care. Interviews showed family and social support as a benefit but also a barrier when individual needs, like low-salt diets, conflict with group practices. Surveys confirmed this, with most participants rarely requesting low-salt options due to cultural norms around hospitality. This consistent evidence confirms the significant cultural impact on HF self-care</p>

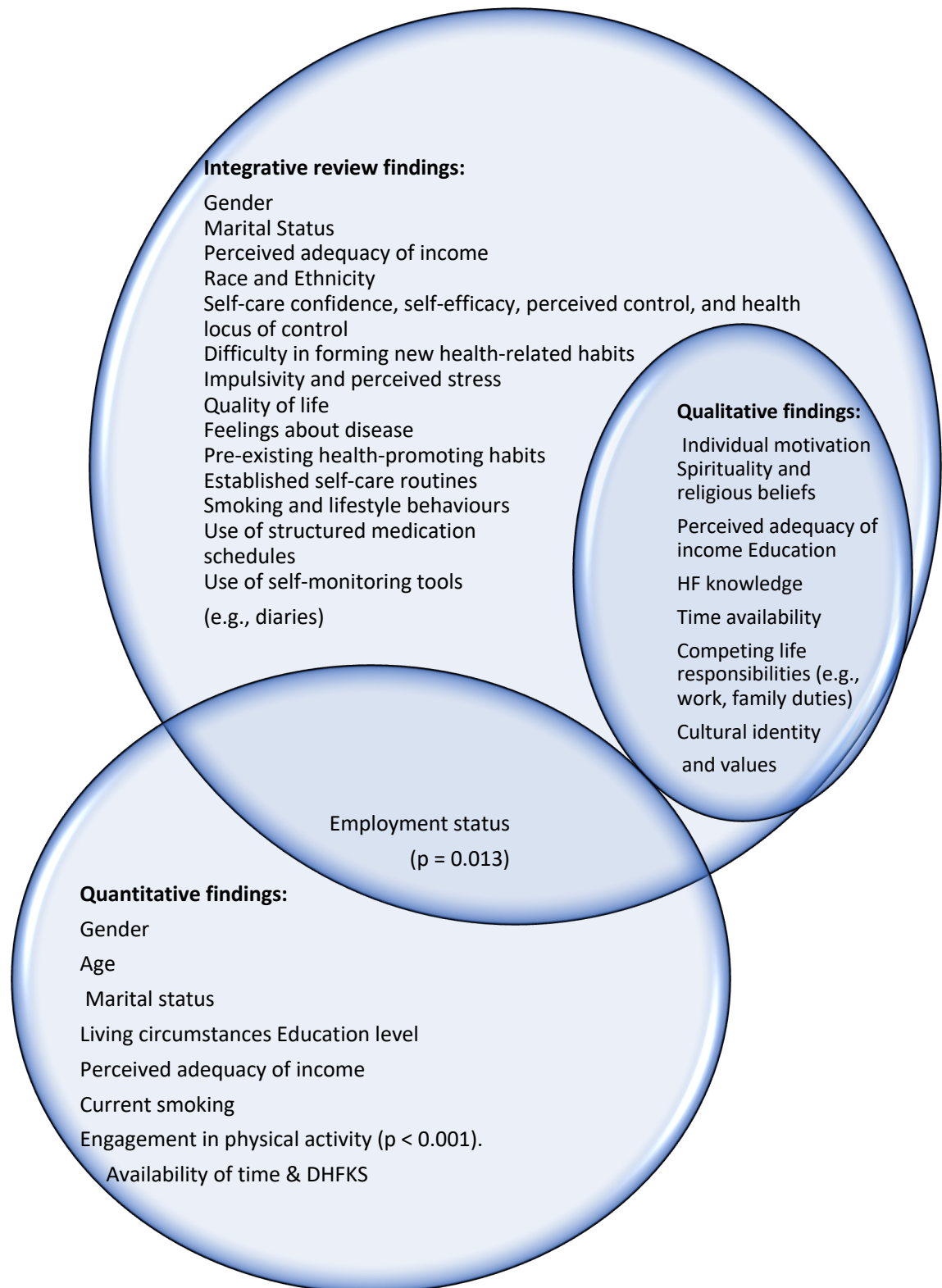
male participants mentioned that lack of understanding or lack of assistance from a wife or food preparer was an obstacle to self-care.		
<ul style="list-style-type: none"> Participants acknowledged that developing self-care habits can be difficult, especially for elderly persons. There was a belief that healthy habits formed early in life are easier to maintain than those adopted later. 	<ul style="list-style-type: none"> Participants' age was not statistically significantly associated with self-care management. However, older participants tended to have inadequate self-care management. 	Dissonance: Interviews suggested that developing self-care habits is harder for older adults, who struggle to adopt new habits later in life. However, the survey found no significant link between age and self-care management, though older participants tended to have poorer self-care.
<ul style="list-style-type: none"> In Saudi society, the roles of women, men, and children are distinctly defined in areas such as food preparation, family care, and distribution of responsibilities. These roles influence various aspects of daily life and healthcare practices, which subsequently impact self-care behaviours. 	<ul style="list-style-type: none"> Gender showed no statistically significant association with self-care maintenance or management. However, male participants tended to have inadequate self-care maintenance but adequate self-care management. Gender: the majority of participants were male (67.5%). 	Dissonance: Interviews highlighted clear gender roles in Saudi society affecting self-care behaviors, suggesting these roles influence care practices. However, the survey found no significant association between gender and self-care maintenance or management, though males tended to have poorer maintenance but adequate management.
<ul style="list-style-type: none"> Analysis of the interview data suggested that having other physical health problems not directly linked to HF, such as incidental foot injuries and stroke, posed challenges to self-care. Co-morbidities, physical and psychological problems, could add complexities to self-care routines. 	<ul style="list-style-type: none"> Having other health issues was significantly associated with self-care maintenance and confidence even though this association did not remain significant in the multiple regression analysis. Severity of comorbidity as CCI score did not show statistically significant association with self-care management. However, participants with mild level of morbidity tended to have inadequate self-care management. 	Partial agreement: Interviews highlighted those co-morbidities, including physical and psychological issues, complicate self-care. The survey showed a significant link between other health issues and self-care maintenance and confidence, though not in regression. CCI scores weren't significantly linked to self-care management, but mild morbidity still showed poorer outcomes. This reflects partial agreement, as both sources recognize the impact of co-morbidities, but with differing strength and detail.
<ul style="list-style-type: none"> Participants cited a lack of time due to personal and 	<ul style="list-style-type: none"> Availability of time, a factor emergent from the interviews, was significantly 	Agreement: Interviews and surveys highlight time constraints as a barrier to self-

<p>professional commitments, which made it difficult to prioritise their health needs.</p>	<p>associated with self-care maintenance and management even though these associations did not remain significant in the multiple regression analysis.</p> <ul style="list-style-type: none"> • Employment status was statistically associated with self-care confidence, with lower self-care confidence linked to being employed ($p = 0.013$), but not to self-care maintenance or management. 	<p>care. Interviews linked lack of time to personal and work commitments. Survey findings showed time availability was initially associated with better self-care, though not in regression. Employment status was linked to lower self-care confidence ($p = 0.013$), supporting the idea that work limits self-care. This confirms agreement across both sources.</p>
<ul style="list-style-type: none"> • Financial stability was identified as a facilitator that enabled access to better healthcare services, medications, and nutritious food. In addition, financially secure participants experienced less psychological distress. 	<ul style="list-style-type: none"> • Perceived adequacy of income was not found to have a significant association with self-care confidence. However, participants who perceived their income as inadequate tended to have low self-care confidence. 	<p>Dissonance: Interviews emphasized financial stability as a key facilitator for better healthcare access and reduced psychological distress, supporting improved self-care. In contrast, the survey found no significant link between income adequacy and self-care confidence, although those perceiving income as inadequate tended to have lower confidence.</p>
<ul style="list-style-type: none"> • Self-care was a personal matter that required an individual's motivation and determination to actively become engaged in looking after themselves through seeking information and following up health advice. 	<ul style="list-style-type: none"> • Chief motivation for self-care did not show association with self-care in bivariate analyses. • Participants responded to the main motivation of improving health: 52.2%; living longer: 15.6%; improving quality of life: 6.3%; staying with family as long as possible: 25.9%. 	<p>Dissonance: Interviews stressed self-care as a personal responsibility driven by individual motivation and determination. However, the survey found no significant association between chief motivation and self-care behaviors. Despite many participants citing health improvement and family as motivators, this did not translate into measurable differences in self-care, showing conflicting evidence.</p>
<ul style="list-style-type: none"> • Cognitive barriers, such as difficulties in understanding or remembering medical instructions, could also be attributed to being preoccupied with being a parent, the nature of their work, being busy with household chores. All these factors were 	<ul style="list-style-type: none"> • Cognitive function scored as Mini Cog was not significantly associated with self-care maintenance or confidence. However, participants who were cognitively impaired tended to have inadequate self-care maintenance but adequate self-care confidence. 	<p>Dissonance: Interviews identified cognitive barriers like difficulty understanding or remembering medical instructions—often due to busy personal and work lives—as important obstacles to self-care. However, the survey found no significant association between cognitive function and self-care maintenance or confidence. Although cognitively impaired</p>

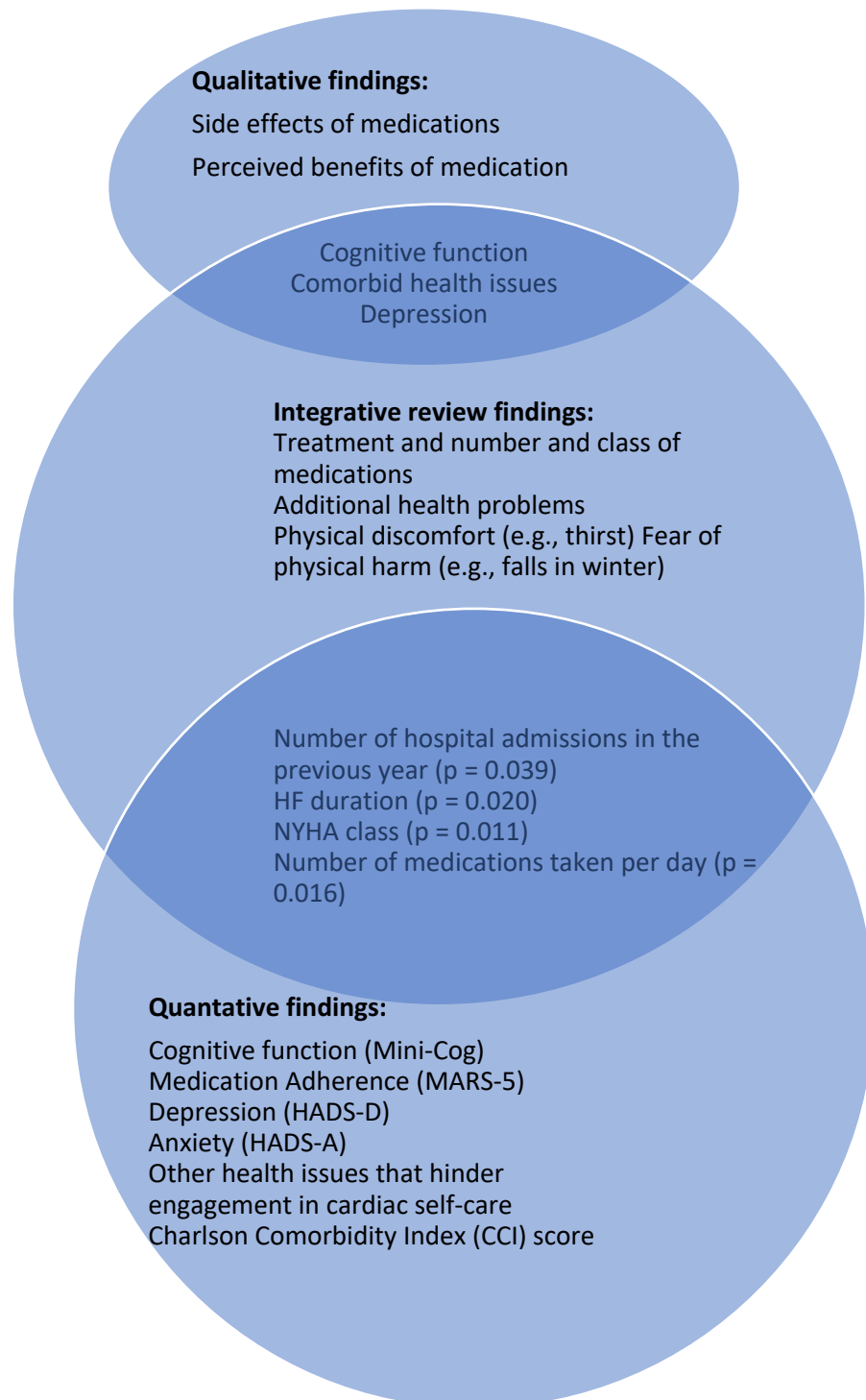
reported as important obstacles to self-care.		participants tended to have poorer maintenance, they showed adequate confidence, reflecting conflicting findings between perceived barriers and measured outcomes.
<ul style="list-style-type: none"> Participants mentioned that the healthcare service facilitated their self-care in terms of it being provided to everyone free of charge, with easy access in case of emergency. However, others residing in remote areas expressed difficulties in accessing them. The existence of facilities promoted participants' self-care practice through encouraging them to be engaged in physical activities. 		Silent: Only the interviews addressed healthcare service access and its role in facilitating self-care.
<ul style="list-style-type: none"> Participants acknowledged the benefits of social media in facilitating self-care. However, some noted concerns such as not everyone, especially older people, being able to use it; the potential for misuse and resultant errors; and the risk of wasting time. 	<ul style="list-style-type: none"> Regarding the internet and social media, opinions varied, with 23.9% considering these things a waste of time, while 28.8% found them helpful for cardiac self-care and 47.4% just use it. Participants opinion on internet and social media was significantly associated with self-care maintenance even though this association did not remain significant in the multiple regression analysis. However, participants who did not use the internet and social media tended to have inadequate self-care maintenance. 	Partial agreement: Interviews and surveys acknowledged the role of social media in self-care. Interviews noted both benefits and concerns, especially for older users. Surveys showed mixed views: 28.8% found it helpful, 23.9% saw it as a waste of time, and nearly half just used it without clear benefit. While initial analysis showed an association with better self-care, this was not significant in the regression analysis. Both sources reflect varied perceptions, confirming partial agreement.
<ul style="list-style-type: none"> Participants acknowledged the external conditions such as adverse weather conditions could limit patients' ability to attend medical appointments or engage in physical 		Silent: Only the interviews addressed the role of external conditions on self-care

activities necessary for their health.		
	<ul style="list-style-type: none"> • The item with lowest confidence scores was their ability to keep themselves free of HF symptoms (at 21.5% not confident and 6.3% extremely confident). • Participants responded as not confident when it came to evaluating the importance of symptoms, recognising changes in their health, and doing something to relieve symptoms (10.7%, 7.3%, and 10.2% respectively). • Confidence in evaluating how well a remedy works was split between being not confident (3.4%), with 33.2% extremely confident. When it came to following treatment advice, 5.9% expressed being not confident while 25.4 % expressed being extremely confident. 	<p>Silent: Only the survey addressed participants' confidence in managing heart failure symptoms and treatment.</p>

Appendix 30: A Venn Diagram to Illustrate Triangulation of the Integrative Review, Qualitative and Quantitative Findings for Personal Factors



Appendix 31: A Venn Diagram to Illustrate the Triangulation of the Integrative Review, Qualitative and Quantitative Findings for Disease-Related Factors



Appendix 32: A Venn Diagram to Illustrate the Triangulation of the Integrative Review, Qualitative and Quantitative Findings for Environmental Factors

