

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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Many studies of heart failure (HF) self-care have been conducted since the last update of the situation-specific theory of HF self-care. **Objective:** The aim of this study was to describe the manner in which characteristics of the problem, person, and environment interact to influence decisions about self-care made by adults with chronic HF. **Methods:** This study is a theoretical update. Literature on the influence of the problem, person, and environment on HF self-care is summarized. **Results:** Consistent with naturalistic decision making, the interaction of the problem, person, and environment creates a situation in which a self-care decision is needed. Problem factors influencing decisions about HF self-care include specific conditions such as cognitive impairment, diabetes mellitus, sleep disorders, depression, and symptoms. Comorbid conditions make HF self-care difficult for a variety of reasons. Person factors influencing HF self-care include age, knowledge, skill, health literacy, attitudes, perceived control, values, social norms, cultural beliefs, habits, motivation, activation, self-efficacy, and coping. Environmental factors include weather, crime, violence, access to the Internet, the built environment, social support, and public policy. **Conclusions:** A robust body of knowledge has accumulated on the person-related factors influencing HF self-care. More research on the contribution of problem-related factors to HF self-care is needed because very few people have only HF and no other chronic conditions. The research on environment-related factors is particularly sparse. Seven new propositions are included in this update. We strongly encourage investigators to consider the interactions of problem, person, and environmental factors affecting self-care decisions in future studies.

KEY WORDS: heart failure, self-care, self-management, theory

The situation-specific theory of heart failure (HF) self-care was first published in 2008¹ and updated most recently in 2016.² In the theory, self-care was defined as a naturalistic decision-making process involv-

ing the choice of behaviors that maintain physiologic stability and the response to symptoms when they occur. The original theory addressed behaviors intended to maintain physiologic stability (self-care maintenance) and manage symptoms (self-care management). Confidence was discussed as a variable moderating and/or mediating the effect of self-care on outcomes. In 2016, a new theoretical concept, symptom perception, an HF-specific form of self-care monitoring,³ was added. Each self-care concept was described as involving both autonomous and consulting elements. That is, some self-care behaviors are initiated without guidance, and others are performed after consulting with others. Problem, person, and environmental factors were described as influencing self-care decisions. Assumptions and propositions were included in both publications. The theory has been cited 477 times as of January 2022.

Two major theories in decision making are prospect theory⁴ and naturalistic decision-making theory.⁵ Prospect

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theory, the basis of research in behavioral economics, addresses the heuristics and biases causing systematic errors associated with poor judgments. Naturalistic decision-making theory focuses on the successes of expert intuition. We argue that decisions about symptoms and HF self-care are guided by naturalistic decision making.⁶

Much of the decision-making literature addresses normative decisions, which are presumed to be rational, carefully considered decisions. Deciding which course of treatment is best for a new diagnosis is usually done in this manner. Yet, routine, everyday choices are best understood using descriptive decision theory. Descriptive theory decisions are often quick and automatic, addressing what *will* occur in a situation, not what *should* occur. Kahneman⁷ refers to this distinction between descriptive and normative decision making as fast and slow thinking.

Experts in naturalistic decision making acknowledge the influence of experience in developing intuition and thus decision making in natural settings involving challenging conditions such as vague goals, time stress, uncertainty, and high stakes (Figure 1).⁵ Experienced decision makers recognize patterns, which contributes to intuition in future decision making.⁸ Intuitive judgments can become skilled judgments if the environment provides valid cues about the situation (eg, the symptom experience) and the decision maker has adequate opportunity to learn the cues.⁹ If cues are inconsistent, as they often are when symptoms occur, patients may make different decisions in seemingly similar situations. When automatic (fast) processes bring a promising solution to mind, mental simulation (slow) is used to examine the potential decision. Nonexperts do not know when they do not know something, so subjective confidence is an unreliable indicator of a valid intuitive decision.⁹ Understanding how HF self-care experts think about

situations may inform the development of interventions that improve decisions and the outcomes experienced by people with HF. For example, Daley and colleagues¹⁰ found that health decisions of older adults with HF began with monitoring, with interpretation and attribution occurring before patients acted on their symptoms. These results illustrate the importance of emphasizing self-care monitoring in HF interventions.

Self-care of HF involves a constellation of behaviors reflecting active engagement and responsibility for self-care maintenance, self-care monitoring, and self-care management of their illness.¹¹ That is, true self-care of HF is not simply exercise or simply medication adherence; self-care that is sufficient to improve HF outcomes involves all 3 behaviors. This premise was confirmed by psychometric testing of the Self-Care of HF Index v.7.2 in which the 3 self-care behaviors fit the data in a simultaneous confirmatory factor analysis (CFI, 0.90; RMSEA, 0.004).¹² Self-care maintenance is typically performed proactively, and self-care management is reactive in that it involves a response to symptoms. Symptom perception is both proactive and reactive; patients who are expert in self-care are proactive in monitoring.¹³ The experience of having symptoms stimulates reactive monitoring of symptoms to promote early detection.¹⁴

Two self-report instruments are available to measure self-care in the HF population, the Self-Care of HF Index¹⁵ and the European HF Self-Care Behavior Scale.¹⁶ These instruments have been translated into several languages, which has led to a large and growing body of research into the self-care behaviors of adults with HF. Now that knowledge on this topic is maturing, we are able to describe how elements of the problem of HF, the person with HF, and the environment influence self-care maintenance, symptom perception, and

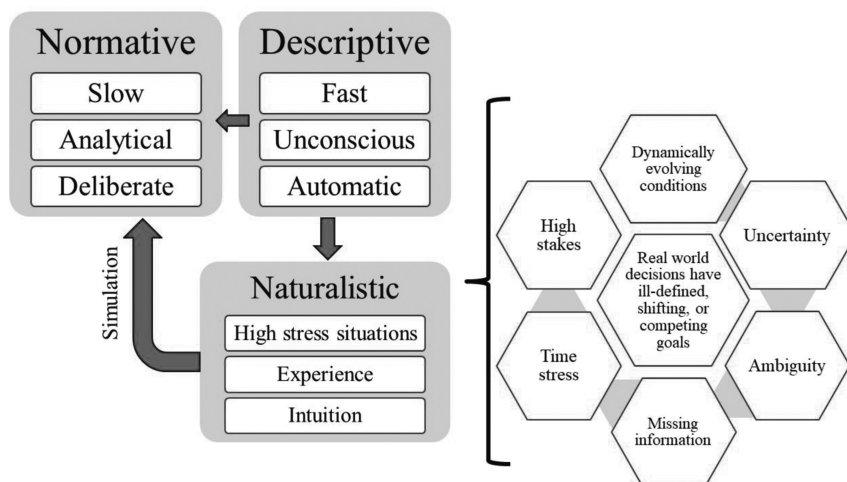


FIGURE 1. Decisions in the natural world often have ill-defined, shifting, and competing goals, which produce high-stress, ambiguous situations. Naturalistic decision making is both an automatic, fast process bringing promising solutions to mind rapidly and a deliberate, slow activity in which mental simulation is used to choose the best option.

self-care management. Thus, the purpose of this theoretical update is to describe the manner in which characteristics of the problem, person, and environment interact to influence decisions about self-care. We approached the literature as theorists interested in the evidence related to the variables in the theory, focusing primarily on studies conducted since the last theory update. As described here, we see strong evidence that elements of the problem, person, and environment influence HF self-care. Problem refers to the physical and emotional consequences of the diagnosis of HF. Person refers to the adult given a diagnosis of chronic HF. Environment refers to the setting in which the person is dealing with the diagnosis of HF. As shown here, environment captures the physical setting, people, and resources such as health insurance. These factors are used to suggest additional propositions for future testing.

The clinical syndrome of HF is characterized by signs and symptoms reflecting structural and/or functional cardiac abnormality.¹⁷ Elevated natriuretic peptide levels and objective evidence of pulmonary or systemic congestion are used to corroborate the presumed diagnosis of HF. Heart failure can be classified as HF with reduced ejection fraction when the left ventricular ejection fraction (LVEF) is 40% or less, HF with mildly reduced ejection fraction when the LVEF is between 41% and 49%, HF with preserved ejection fraction when the LVEF is 50% or greater, or HF with improved or recovered ejection fraction when someone with an LVEF of 40% or less has an increase in LVEF of 10 points or greater and the second measurement of LVEF is greater than 40%.¹⁷

The Trajectory of Heart Failure

The natural history of HF is characterized as a continuum, a trajectory that proceeds through 4 stages.¹⁷ Persons with

risk factors such as hypertension, diabetes, coronary artery disease, and obesity/metabolic syndrome are at risk for HF (stage A). In stage A, attention is given to prevention. Stage B is diagnosed in patients without current or previous signs or symptoms of HF if they have evidence of structural heart disease, abnormal cardiac function, or elevated natriuretic peptide levels.¹⁷ Stage C HF is characterized by current or previous symptoms of HF caused by a structural or functional cardiac abnormality. The final stage of HF is stage D or advanced HF. Individuals with stage D HF have severe, often refractory and intractable symptoms at rest, despite optimal therapy. They are often re-hospitalized and may be considered for transplantation, mechanical support, or palliative care.¹⁷

Symptoms are clearly a core element of the diagnosis of HF and its progression over time. Typical symptoms of HF include breathlessness, orthopnea, paroxysmal nocturnal dyspnea, reduced exercise tolerance or inability to exercise, fatigue, tiredness, ankle swelling, swelling, and bendopnea.¹⁷ As described further here, symptoms are also important in the theory of HF self-care because symptoms must be perceived and labeled appropriately if self-care management behaviors are to be initiated. Limitations due to symptoms are often classified using the New York Heart Association (NYHA) functional classification system, which labels the limitations due to symptoms on a scale of I to IV. Patients who are NYHA class I have no limitations of their functional abilities due to symptoms. Those who are NYHA class II have a slight limitation in their abilities. In NYHA class III, there is marked limitation in functional abilities. Persons with HF who are NYHA class IV have symptoms at rest and discomfort with any physical activity, so they are severely functionally limited (Figure 2). Symptoms can serve as both a predictor and an outcome of HF self-care.

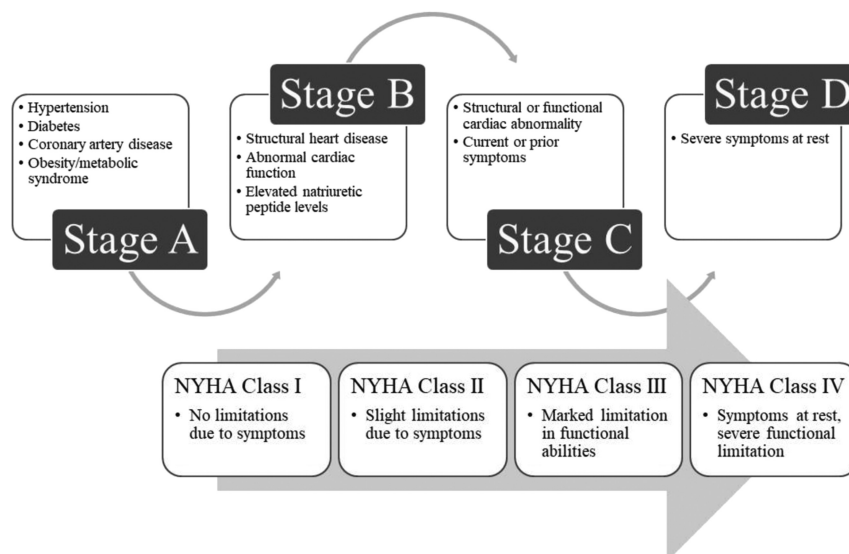


FIGURE 2. The clinical syndrome of heart failure progresses through stages of prevention to severe symptoms at rest. Limitations due to symptoms are captured in the New York Heart Association (NYHA) classes I to IV.

People with HF and their loved ones experience the illness over time, progressing through a trajectory of various stages of HF and normal life course event such as marriages, births, and school graduations simultaneously.¹⁸ This experience is captured as the perception of temporality.¹⁹ Understanding the temporal experience of HF involves acknowledging thoughts about life (past), the illness (present), and the future, recognizing that time can no longer be taken for granted after an HF diagnosis.¹⁹ Hernes and Schultz²⁰ discuss time as the medium through which people interpret reality, making the point that temporal research should include the activities through which people imagine pasts and futures that lie beyond the present.

Problem, Person, and Environmental Factors

Literature on the influence of the problem, person, and environment on HF self-care has grown considerably during the last 5 years. In the original theory,¹ we stated that problem, person, and environment influence decisions about self-care by interacting with knowledge, experience, skill, and compatibility with values. Yet, much of the research on these factors continues to examine these factors as single determinants of self-care instead of exploring how they influence each other. The interaction among variables remains a rich area for further research, as specified in the propositions hereinafter.

Problem Factors That Influence Heart Failure Self-care

Adults with HF often experience a variety of illness-related issues that complicate self-care. Heart failure causes neurohormonal, inflammatory, and hemodynamic abnormalities, all of which are thought to contribute to cognitive impairment.²¹ Approximately 70% of patients with HF have at least mild cognitive impairment, which has been shown to be associated with poor self-care.²² This association is not surprising, because self-care behaviors require memory and cognitive skills (eg, remembering to take medications and understanding symptom changes).^{23,24} A study using magnetic resonance imaging–based diffusion tensor imaging revealed that lack of brain tissue integrity in executive function regulatory regions was associated with poorer HF self-care maintenance and self-care management.²⁵ Poor self-care may be responsible for the higher mortality rates²⁶ and increased risk of 30-day rehospitalization in persons with HF and cognitive impairment.²⁷

In addition to cognitive impairment, most persons with HF are older adults with additional comorbid conditions. A recent study of 22476 persons with HF conducted in Australia found that at least 20% of patients also had atrial fibrillation, cancer, valvular heart diseases, hypertension, diabetes mellitus, or ischemic heart

disease.²⁸ A systematic review of HF clinical trials published between 2001 and 2016 reported a wide range of cardiac and noncardiac comorbidities. The most common cardiac comorbidities were coronary heart disease (92%), diabetes (91%), hypertension (80%), obesity (72%), atrial fibrillation (71%), and kidney disease (55%); the most common noncardiac diseases were stroke (55%), chronic obstructive pulmonary disease (33%), peripheral arterial disease (23%), and cancer (12%).²⁹ Even conditions such as cancer in remission and human immunodeficiency virus/AIDS may become chronic in nature and present additional self-care challenges when co-occurring with HF. Currently, there is a dearth of research examining HF self-care in most of these populations.

Specific conditions have been identified as complicating HF self-care. Diabetes is a common comorbid illness, and individuals with both HF and diabetes commonly report conflicting instructions about what foods they can eat.³⁰ In 1 study, persons with both HF and diabetes took more daily medications than patients with only HF.³¹ Yet, in another study of adults with both HF and diabetes, the presence of diabetes did not influence HF self-care.³² Sleep disorders such as obstructive sleep apnea are also common in HF, and a recent systematic review found that poor sleep was associated with poor HF self-care.³³ The mechanism explaining this relationship is unclear, but it may be that poor sleep quality impairs cognition and the ability to remember treatments such as medications.³⁴ Poor sleep quality may also decrease the motivation needed to perform self-care.³⁵

Depression is one of the most prevalent psychological comorbid conditions in people with HF.³⁶ Investigators have found that depression predicts self-care maintenance, self-care management, and self-care confidence.^{37,38} Others have reported that HF patients with depression have lower treatment adherence, one element of self-care maintenance. Self-care neglect may contribute to the reduced quality of life and increased mortality seen in persons with HF who are depressed.³⁹

Comorbid conditions make HF self-care difficult because symptoms may overlap, causing conflict regarding which set of self-care skills to use.³⁰ Previous studies have shown that patients with more comorbidities have poorer HF self-care⁴⁰ and self-care is better when patients are free from comorbid conditions.⁴¹ In a meta-summary of qualitative studies, comorbidity was identified as a barrier to effective HF self-care.⁴²

Self-care maintenance may be complicated by poor care coordination among multiple providers; fragmented care may lead to inconsistent instructions on medications and diet.³⁰ As a result, patients make their self-care decisions based on self-efficacy, baseline knowledge, attitudes, and finances rather than provider instructions.⁴³

Patients with comorbid conditions may also have functional limitations (eg, arthritis, residual effects of stroke, chronic obstructive pulmonary disease, diabetic

neuropathy) that influence their ability to engage in self-care maintenance behaviors such as standing for meal preparation or exercise.^{43,44} The sheer number of medications prescribed for multiple conditions, drug interactions, and adverse effects contribute to poor adherence in persons with HF.⁴⁵

Since the last theory update in 2016, there has been a growing body of research examining HF symptom perception and interpretation. Symptom perception may be complicated by the presence of other chronic conditions. In addition to monitoring for an HF exacerbation (eg, daily weights, ankle edema, fatigability), those with other conditions may be instructed to monitor glucose or blood pressure. Remembering to complete these monitoring tasks and interpreting the results may be difficult because of cognitive dysfunction, sleepiness, or depression.⁴⁶ Comorbid conditions may make the cause of a symptom unclear. For example, numerous illnesses cause fatigue so differentiating HF fatigue from that of another illness can be extremely difficult.^{47,48}

When symptom interpretation is difficult, patients may “wait and see” before engaging in self-care management.⁴⁹ In 1 study, we found that patients who interpreted tiredness as arthritis rather than HF took no action.⁵⁰ Delays in managing symptoms ultimately can lead to deterioration and a life-threatening emergency.

Person Factors That Influence Heart Failure Self-care

The HF symptom profile differs by age and sex,⁵¹ and age has been found consistently to influence HF self-care. Heart failure self-care requires physical and intellectual abilities such as being able to visit the grocery, understanding what ankle swelling means, and remembering to take medications. Aging processes impair these abilities, and people often become less able to perform self-care. One study found that patients with HF

between the ages of 18 and 27 years were 3.5 times more likely to perform adequate self-care than those 55 years or older.⁴⁰ Similar associations were found in another study in which older age was a determinant of lower HF self-care.⁵² Studies of the influence of sex on HF self-care have yielded inconclusive results.

Knowledge about HF and self-care is foundational to self-care decision making.⁵³ Indeed, many HF self-care interventions focus on increasing knowledge,^{54,55} and most study authors report that knowledge predicts self-care.^{56,57} Conversely, a study describing the trajectory of HF self-care over 1 year and factors related to changes in self-care found that knowledge did not predict self-care over time.⁵⁸ These results support our contention that knowledge is necessary but not sufficient to improve HF self-care (Figure 3).⁵⁹

Skill refers to the ability to apply information in a specific context, that is, to carry out a task with a predetermined result.⁶⁰ We previously described 2 types of essential self-care skills, namely, tactical (“how to”) and situational (“what to do when”) skills, for persons with HF. There is growing appreciation of the importance of skill development in HF self-care.^{61–63}

Health literacy is closely tied to knowledge and skill. Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”⁶⁴ Health literacy requires skill in reading, listening, analytical thinking, and decision making as well as the ability to apply these skills to health situations.⁶⁵ For persons with HF, health literacy includes the ability to understand instructions on medication bottles, patient education materials, and verbal instructions by healthcare professionals.⁶⁶ Health literacy supports the development of skills needed to identify early warning signs of deterioration and make decisions about symptom management. Unfortunately, poor health literacy is extremely common

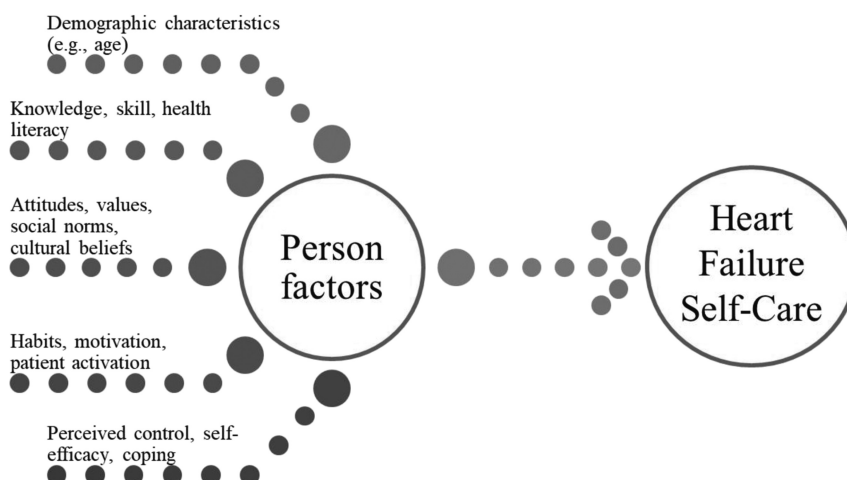


FIGURE 3. Numerous person factors or individual characteristics influence heart failure self-care.

among patients with HF and associated with increased risks in mortality and hospitalization.⁶⁷ A recent systematic review reported that 1 in 4 persons with HF had inadequate health literacy⁶⁷ and the prevalence is even higher in ethnic minority groups.⁶⁸

The results of research examining health literacy, knowledge, and self-care are mixed.⁶⁹ Wu et al⁷⁰ reported that adequate health literacy was associated with better HF knowledge, including behavior-specific knowledge. Low health literacy is associated with poor self-care maintenance,⁶⁹ poor symptom monitoring,⁷¹ and inadequate self-care management.⁷² Wang et al³⁸ reported that health literacy and confidence mediated the relationship between depression and HF self-care management. Others found a significant association between health literacy and HF knowledge but not self-care maintenance⁷³ or self-care management.⁷⁴ When health literacy was found to be associated with self-care, other factors such as age and cognition were better predictors of HF self-care.⁷⁵ Collectively, these findings are consistent with the theoretical premise that the situation-specific interaction of multiple factors influences self-care decisions and actions.

Attitudes reflect general favorableness toward a behavior, action, or situation.⁷⁶ Experiential attitudes (eg, easy or difficult) are derived from the emotional response to the idea of performing the behavior. Instrumental attitudes (eg, good or bad) are determined by beliefs about outcomes of the behavior or action.⁷⁶ When attitudes about a specific self-care behavior, for example, following a low-salt diet, are favorable (thought to be easy to do or associated with a good outcome), one is more likely to engage in self-care. Conversely, unfavorable attitudes about specific behaviors (eg, diet, exercise, medication) as difficult, not beneficial, or harmful may serve as barriers to effective self-care.⁷⁷ To date, researchers exploring attitudes about HF self-care have used mostly qualitative methods to describe how attitudes influence self-care,⁷⁷ including adherence to diet,⁷⁸ medication,^{50,79} and treatment-seeking delays for symptom management.^{50,74,80} Results confirm that HF self-care is more likely when attitudes are favorable.

Perceived control is conceptually related to attitudes in that positive experiential and instrumental attitudes improve perceived control. Perceived control, the belief that one has the ability or resources required to cope with a diagnosis, is positively associated with HF self-care.^{81,82} Researchers examining perceived control and self-care report that higher perceived control measured quantitatively is associated with better self-care maintenance^{78,81,83} and symptom management.⁵⁸ In depressed patients with HF, perceived control independently predicts symptom status.⁸² The hypothesized pathway linking perceived control, symptom severity, and self-care is consistent with the situation-specific theory of HF self-care and a potential target for future interventions.

Values are core beliefs held by an individual. Because these beliefs are abstract, subjective, and extremely significant to the person, they impact cognitive, behavioral, and emotional responses. There is emerging research suggesting that values influence patients' choices and preferences about health, including HF self-care. According to a recent systematic review, there are multiple bidirectional interactions between the values of patients with HF and their self-care decisions.⁸⁴ Furthermore, although the effects of HF, including symptoms and functional status, may influence how values are prioritized, personal values influence the decisions made about self-care. Self-care behaviors may positively or negatively impact how values are prioritized and the extent to which people can pursue prioritized values. The priority given to values also may change over time and under specific circumstances, for example, when the ability to pursue a prioritized goal is in conflict with physical ability. When interventions addressing knowledge and skills are unsuccessful, values may need to be addressed.

Karimi-Dehkordi and Clark⁸⁵ categorized values that impact HF self-care as *self-related* or *other-related*. Self-related values are concerned with one's sense of self and life circumstances, and *other-related* values are concerned with social obligations (eg, traditions, responsibilities) and social benefits (socialization, recognition). Others have described how a valued sense of self, social obligations, and social benefits influence self-care positively^{61,86} (eg, symptom management) or negatively through nonadherence⁸⁷ (eg, intentionally skipping medication or delaying treatment), which contributes to increased symptoms.^{50,80} Collectively, this research highlights that values may function in a hierarchical system where priority is assigned but can be changed based on experience and related consequences.

Social norms, conceptually related to values, specify which behaviors are acceptable within a group or society.⁷⁶ As such, social norms are linked to specific self-care behaviors including diet, exercise, medication adherence, and substance use. Similarly, cultural beliefs are ideas held as truths that are learned and shared across groups of people.⁷⁶ Previous research illustrates the potent influence of social norms and cultural beliefs on HF self-care.^{88,89} Notably, several studies have found a significant association of dietary adherence with social norms and cultural beliefs among diverse populations.⁸⁸⁻⁹⁰ For example, in a systematic review of dietary intervention outcomes and behavioral determinants, social norms and beliefs were associated with sodium intake in persons with HF but were not addressed in interventions.⁹¹ We have reported the influence of social norms and cultural beliefs on the willingness of patients to ask for help with self-care including meal preparation, symptom monitoring, and symptom management.⁵⁰ In our qualitative meta-synthesis

examining patterns of medication adherence, we reported that social norms related to behaviors such as alcohol and drug use may adversely influence medication adherence when there is discordance between the behavior and social norms.⁸⁷

Cultural beliefs about medication similarly contribute to nonadherence.⁸⁸ In a sample of older Chinese patients with HF, in-depth interviews revealed 7 cultural themes illustrating that self-care recommendations were challenging to follow because of cultural values placed on health and illness, customary way of life, preference for folk care and the Chinese healthcare system, and factors related to kinship and social ties, religion, economics, and education.⁸⁹ Another study demonstrated that culturally and linguistically diverse populations in Australia with limited English language proficiency were at an increased risk for rehospitalization and emergency department visits, with a greater cumulative incidence of HF-related readmissions and emergency department visitations.⁹²

Habits, good and bad, are built over the life course through socialization. These habits commonly include substance use such as alcohol and tobacco, dietary habits, and exercise. Each of these behaviors is part of self-care maintenance; thus, habits may be considered potent influences on HF self-care. Researchers have found that adapting or changing daily routines or habits developed over time is challenging for people with HF, especially if those habits were socially or culturally constructed.⁹³ We found that leveraging existing healthy habits such as routine exercise (eg, daily walks) and healthy eating or reactivating past habits can facilitate HF self-care.⁶¹

Motivation is another person characteristic that triggers HF self-care.⁹⁴ Motivation is important to develop the energy needed to initiate self-care and guide oneself toward performing activities and achieving goals. Motivation is important to health-enhancing behaviors because it drives people to adapt and solve health-related problems. Patients with higher motivation are more likely to search for a treatment of their condition and to follow these treatments despite difficulties.⁹⁵ Numerous studies have found not only an association between motivation and HF self-care⁷⁷ but also that interventions that improve motivation for behavior change are effective in improving HF self-care.^{96,97}

Motivation may stimulate patient activation defined as the belief, knowledge, skills, and behavioral repertoire needed to manage self-care and maintain health.⁹⁸ When studies on patient activation were synthesized in a systematic review of randomized controlled trials, interventions that improved patient activation significantly improved self-care in a variety of other chronic conditions⁹⁹ and for a variety of intermediate outcomes such as depression, anxiety, and self-efficacy.¹⁰⁰ Investigators studying the association between patient activation and HF self-care demonstrated that patients with

HF who are more “active” engage in better self-care behaviors¹⁰¹ regardless of their HF knowledge and health literacy¹⁰² and that patient activation mediates the relationship between self-efficacy and self-care when HF self-care knowledge is low.¹⁰³

Self-efficacy was defined by Bandura¹⁰⁴ as the belief by which individuals feel the capacity to execute specific behaviors. People who feel self-efficacious in self-care are confident that they can perform relevant self-care behaviors. Previous versions of the theory of HF self-care have consistently emphasized the important role of self-efficacy in influencing self-care behaviors.^{1,2} That is, most of the person factors influencing HF self-care influence self-care because they increase or decrease self-care self-efficacy. This theoretical proposition was confirmed in several studies demonstrating that self-care self-efficacy mediates the relationship between HF self-care and gratitude toward life,¹⁰⁵ social support,¹⁰⁶ knowledge,^{72,107,108} depression,^{72,109} type D personality,¹¹⁰ health literacy,¹⁰⁸ and cognition.^{111,112} There are also studies showing that, even without mediation, self-care self-efficacy has a direct effect on HF self-care.¹¹³

Coping is a dynamic process that uses cognitive and behavior strategies to manage the external and internal demands of a specific person-environment transaction appraised as stressful or exceeding one's resources.¹¹⁴ A systematic review of studies examining coping strategies in persons with HF found that both emotion-focused coping and problem-focused coping were positively associated with HF self-care.¹¹⁵ Emotion-focused coping behaviors of acceptance and disavowal were associated with better physical and psychological self-care, but escape avoidance was negatively associated with self-care. Problem-focused approaches such as problem solving, planning, and information seeking were positively associated with better physical and psychological self-care.

Problem-focused coping applied to self-care is aligned with naturalistic decision making.¹¹⁶ That is, as coping strategies for self-care are initiated, and the interaction between the problem, person, and environment changes, coping facilitates reappraisal and response to the situation. A qualitative study examining the HF self-care coping process identified meaning-oriented coping as a process used to recognize, respond to, and cope with the challenges of HF and self-care.¹¹⁷ Research is needed to examine coping strategies over the trajectory of HF as self-care demands and resources change and novel situations emerge.¹¹⁸

Environmental Factors That Influence Heart Failure Self-care

This update to the theory includes important new content summarizing environmental influences on HF self-care. McCauley and Hayes¹¹⁹ organize environmental science into 4 main categories: physical (eg, natural

disasters), chemical (eg, allergens, lead exposure, and air pollution), biological (eg, antibiotic resistance), and cultural or social hazards (eg, violence, racism). Seasonal variations in weather have been documented to influence physical activity patterns in people with HF, with less physical activity in the winter months.¹²⁰ In a recent study, participants living in areas with high crime and violence experienced numerous stressors, which negatively influenced their ability to adhere to the treatment regimen and manage HF symptoms.¹²¹ Stressful events commonly preceded an HF hospital admission. These environmental influences may increase the need for self-care and/or acutely decrease the ability to access resources (eg, medications) and services (eg, screening) needed in self-care.

In communities experiencing hazards, local organizations and community networks can reduce risk factors through planning and intervene to mitigate individual vulnerability.¹²² Factors that increase access to resources and services include having health insurance, proximity to providers, transportation, the Internet, and public policy. These issues are explored further here (Figure 4). It should be noted that some environmental factors such as public parks, senior centers, and public libraries presumably promote self-care behaviors through relaxation, support, and the acquisition of knowledge, but these environmental factors have not been studied in HF.

A growing body of research illustrates that people in rural settings, defined based on both population density and the primary livelihood of residents,¹²³ face unique challenges limiting their access to care that are not experienced by those in urban settings. Rural dwellers have a growing gap in life expectancy compared with urban dwellers.¹²⁴ In the United States, rural dwellers report poorer health, more psychological distress, and less physical activity than urban dwellers,¹²⁵ which has been attributed to unemployment, poverty, poor health literacy, lack of access to capable healthcare providers and specialists, and distance to tertiary care centers.^{123,126–128}

In the first year after an HF diagnosis, cardiovascular hospitalization rates have been found to be 1.6 times greater among rural dwellers with HF compared with urban dwellers.¹²⁹ It seems that potentially preventable hospitalizations caused by chronic diseases such as HF are increasing, which may be attributed to a dichotomy

between urban and rural resources.¹²³ The effect of this dichotomy on HF outcomes is not unique to a single country; a large epidemiologic trial of persons from 348 urban and 280 rural communities on 5 continents found that rates of cardiovascular events and fatal cardiovascular events were higher in rural communities (4.83 vs 6.25 events per 1000 person-years, $P < .01$) after 4.1 years of follow-up.¹³⁰

The use of telemedicine may improve access and the quality of care provided to patients, including those in rural settings. A Cochrane review concluded that telemonitoring can reduce HF-related hospitalizations and all-cause hospitalizations.¹³¹ However, other studies have failed to demonstrate an effect of telemedicine on mortality or hospitalizations, raising doubts about its usefulness in HF.¹³² Limited access to the Internet complicates the ability of rural patients to use telemedicine. The Pew Research Center recently reported that adults dwelling in rural areas are less likely than suburban adults to have home broadband and less likely than urban adults to own a smartphone, tablet computer, or traditional computer.¹³³

The man-made structures, features, and facilities in which people live and work, known as the built environment, have a strong impact on HF patient outcomes. Food deserts, defined as regions in which relatively few food retailers provide fresh produce and healthy groceries for affordable prices, are common in urban environments worldwide due to affordability, transportation, and cultural factors.^{134,135} In 1 study, authors examined the impact of food deserts in a US sample of patients with HF.¹³⁶ After a median of 827 (506, 1379) days, living in a food desert was associated with a 39% increased risk of repeat all-cause hospitalizations and a 30% increase in HF-specific hospitalizations.¹³⁶

Social support may be the most powerful environmental influence on HF self-care.¹³⁷ In HF, this support is often provided by family members.¹³⁸ Perceived support, the subjective perception of support received by or available to an individual when needed, has a powerful influence on health outcomes.¹³⁹ Support from family has been shown to increase HF self-care behaviors. For example, a comprehensive, culturally appropriate HF intervention involving family caregivers significantly improved self-care maintenance and confidence and reduced HF readmission at 30 days compared with a

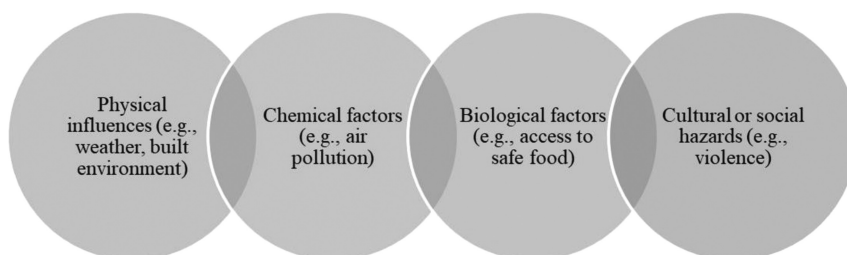


FIGURE 4. A variety of physical, chemical, biological, and cultural or social hazards exist in the environment and influence the outcomes of heart failure through effects on the person and/or the problem. Public policy can mitigate or exacerbate these hazards.

control group.¹⁴⁰ Gallagher and colleagues¹⁴¹ reported increased dietary and medication adherence in patients with HF, especially when the support was provided by partners. In the situation-specific theory of caregiver contribution to HF self-care, we theorized that informal caregivers improve patient outcomes (eg, mortality, quality of life, and hospitalizations).¹⁴² In the 3-arm MOTIVATE-HF trial,⁹⁷ the intervention arm in which motivational interviewing was performed with both patients and caregivers, patients with HF had the best self-care⁹⁷ and quality of life,¹⁴³ and the lowest symptom burden¹⁴⁴ and mortality.¹⁴⁵

There is a growing body of literature to suggest that concordance is an important dimension of the patient-provider relationship that facilitates trust and enhances communication. A study of patients with HF found that communication barriers and a poor relationship with the provider discouraged HF self-care.¹⁴⁶ Healthcare providers with shared racial/ethnic or cultural backgrounds may positively influence self-care education and behavior uptake, whereas cultural differences that erode trust and lack cultural awareness or knowledge of differences may complicate self-care.¹⁴⁷

Considering the wider environmental influences, we examined how well self-care is addressed in legislation, laws, regional programs, or public policy. Drivers of policy include (1) evidence from other countries or different jurisdictional levels demonstrating that particular policies and programs have been successful, (2) public opinion and media interest, and (3) enthusiastic champions

for self-care.¹⁴⁸ The International Self-Care Network has been influential in supporting efforts of local authorities, urban planners, community organizations, and private practitioners that provide self-care services and support communities in establishing policies emphasizing self-care. Progress is evident in efforts of the World Health Organization,¹⁴⁹ the United Nations,¹⁵⁰ and various countries including China, Sweden, Australia, the United Kingdom, and Canada. Individual companies are joining the effort; in 2018, Bayer published a Global Policy Blueprint focused on self-care.¹⁵¹ The International Self-Care Network is working with other organizations to help devise self-care-friendly policies.

Interaction of Problem/Person/Environmental Factors Influencing Self-care Decisions

The theory of HF self-care is grounded on the premise of naturalistic decision making, which states that, in real-world settings, people make decisions using their previous experience and the information available to them at the moment.² In addition to experience with relevant situations, situation-specific decisions are influenced by knowledge, skill, and values; both the decision and the action must be consistent with values. The interaction of the problem, person, and environment, which reflects the naturalistic decision-making process, creates a situation in which a self-care decision is made (Figure 5).

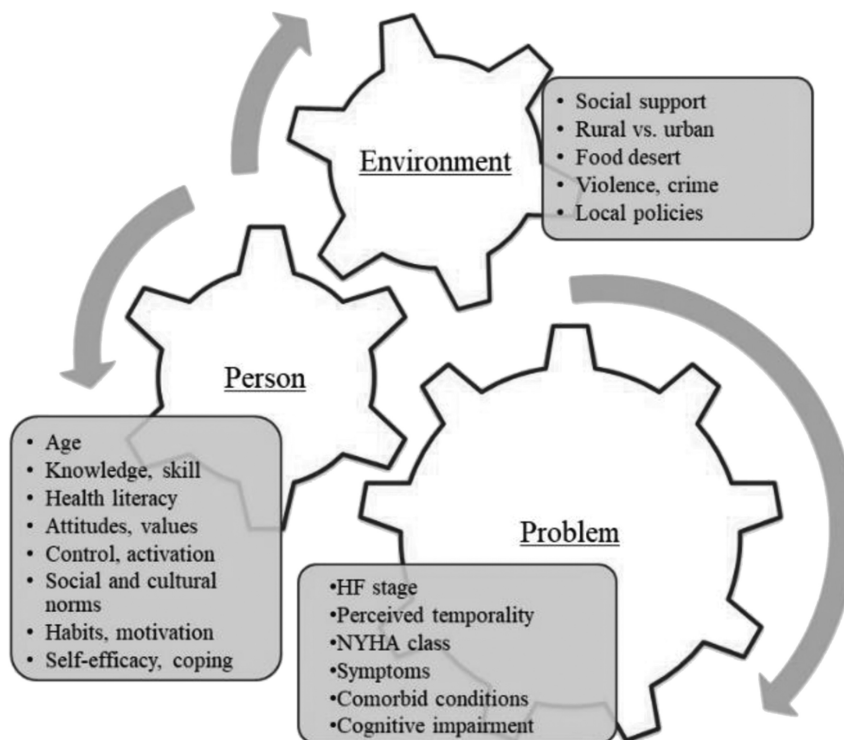


FIGURE 5. The interaction of the problem, person, and environment creates a situation in which a self-care decision is needed. NYHA, New York Heart Association.

Symptoms are a key element of the problem that predicts HF self-care. We have argued that there is a “window of opportunity” in which the person with HF can embrace self-care and stave off or at least slow disease progress. Yet, clinically, we routinely see patients who forego self-care until their symptoms are intractable. The way symptoms influence self-care remains poorly understood. One study found that fewer unpleasant symptoms were associated with greater self-care,¹⁵² whereas another found that patients with a high symptom burden that persisted for a 6-month period had significantly better HF self-care.¹⁵³ Longitudinal studies of changes in symptoms and self-care over time are greatly needed.

The person with HF who is in a situation requiring a self-care decision may have previous experience (eg, assessing weight gain as part of the daily routine), the necessary knowledge and skill (eg, knows “how to” adjust the diuretic dose), and consistent values (eg, belief that self-care is easy to do and/or will lead to a favorable outcome such as averting worsening symptoms). An alternative situation is that a component of the situation—a problem-, person-, or environment-related factor—may be different or new (eg, a new symptom or not at home). The new or different situation influences the decision-making process, which influences the self-care action chosen at a particular moment. It is important to note that the problem, person, and environmental factors may be weighted differently in different situations and situations may change rapidly. Thus, the interaction of the 3 factors described previously can create many different situations requiring unique self-care decisions. It is these unique situations that demonstrate the relevance of this situation-specific theory.

In the 2016 version of the theory, we described the process of making a self-care decision as including situational awareness, mental simulation of a course of action, and evaluation of the outcome of the action.² During the process of making a self-care decision, past experiences (ie, previous decisions made about a situation, action taken, and the outcome) are applied

to the situation at hand. Values, including cultural beliefs and social norms, are considered. Values may be reprioritized depending on the situation (eg, meeting a social obligation today vs worsening symptoms tomorrow). Previously, we emphasized the essential influence of self-care self-efficacy in the individual's ability to engage in self-care.^{111,112} Our work suggests that people will not make the decision to perform a recommended self-care behavior if they lack self-efficacy in that particular situation (eg, while traveling).¹³ Finally, the self-care action must also be consistent with the decision-making characteristics. That is, the person making the decision must have the experience, knowledge, and skill in the action as well as the specific situation and context. The action must be consistent with the values.

In effect, self-care action reflects the decision to engage in self-care or not to engage in self-care. For example, eating a low-salt diet, taking medication, weighing daily, and taking an extra diuretic are all self-care decisions. Furthermore, *not* adhering to a low-salt diet, skipping medication, foregoing a daily weight, and not taking an extra diuretic are also self-care decisions. People make a decision to adhere or not adhere.⁸⁷ These choices are situation-specific decisions and actions based on a decision-making process. The person deciding to engage or not engage in self-care has considered past experience, knowledge, and skill and weighed their values. In doing so, they decided to perform or not perform self-care. This nuance is important; in addition to using approaches to influence self-care that include strategies to increase knowledge acquisition and culturally relevant skill development, innovative ways to address unfavorable attitudes or clarify values are needed.

Naturalistic decision making emphasizes that real-world decisions have ill-defined, shifting, or competing goals. We have noted previously that reflection or contemplation may facilitate knowledge acquisition and thus promote self-care.³ Here, we clarify that reflection is probably most beneficial for self-care maintenance behaviors because these behaviors are less immediate and challenging than self-care management. The

TABLE Theoretical Propositions

1. Experience, knowledge, skill, and values all contribute to HF self-care decisions, but situations are unique so people prioritize these factors differently based on the context in which decisions are made.
2. Problem, person, and environmental factors may be weighted differently by a single individual in different situations and when situations change rapidly.
3. Decisions about self-care and self-care actions must be consistent with values. Personal values influence these decisions, but symptoms and functional status influence how values are prioritized.
4. People with HF who live in environments that pose hazards or limit access to resources are more at risk for poor self-care, even when person and problem factors are optimized.
5. Symptom perception is both proactive (eg, routine monitoring) and reactive (eg, having symptoms stimulates reactive monitoring of symptoms).
6. If people engage in HF self-care earlier in the trajectory, they could slow the progression of the disease. That is, proactive self-care has better outcomes than reactive self-care.
7. Both engaging and not engaging in self-care reflect active decisions. In other words, people who do not engage in self-care have made a decision to not engage.

What's New and Important

- We know that the problem, person, and environment influence self-care decisions, but here, we emphasize the interaction among these 3 factors.
- New emphasis is placed on environmental factors influencing self-care: weather, crime, violence, access to the Internet, the built environment, social support, and public policy.
- Seven new theoretical propositions are included in this update.

immediacy of a new symptom may curtail the time available for reflection and simulation. The nature of the decisions involved in symptom perception is unclear at this time.

Suggestions for Future Research

In the original version of the theory, we specified 3 theoretical propositions.¹ In the first update, we specified another 8 propositions.² The only propositions that remain untested are from the updated theory: (1) Decisions about self-care may be conscious or subconscious, that is, conscious and subconscious decisions reflect choices driven by the interaction of person, problem, and environmental factors, and (2) as self-care self-efficacy increases, autonomous self-care behaviors increase. In this update to the theory, we add 7 new propositions to be tested (Table).

To date, the research examining the person-related factors of attitudes, values, habits, and coping has been predominately qualitative, with individual factors explored in isolation. Research is needed to examine the interaction of these influences and identify ways to elucidate their situation-specific weight or relative contribution to self-care decision making. Results of this type of research will facilitate the development of theory-guided interventions. In addition, several of the person-related variables such as culture and values are insufficiently tested.

This update to the theory addresses environmental factors (eg, safety, food deserts) in more detail than our previous publications. This element of the theory is relatively new, and there is little research addressing how environmental factors influence self-care. No research has examined how natural disasters, air pollution, or weather events influence HF self-care. This is a rich area for future research.

In addition to these specific person-related and environmental variables, we strongly advocate that future research address mechanisms using mediation and moderation analyses. As noted previously, there are numerous examples of studies demonstrating that self-care self-efficacy is a mediator of the relationship between problem, person, and environmental characteristics and self-care. There are, however, relatively few ex-

amples of studies testing moderators associated with self-care. Auld and colleagues¹⁵⁴ demonstrated that self-care maintenance moderated the relationship between depressive symptoms and physical quality of life in adults with HF. In another study, depressive symptoms had a negative effect on self-care of patients with HF living alone, suggesting that social support moderates the relationship between depressive symptoms and self-care.¹⁵⁵ Another example was our study of the moderating effect of comorbidity on the relationship between self-efficacy and HF self-care⁴³; patients with moderate levels of comorbidity had significantly higher self-care maintenance. However, in another study, we found that when comorbidity was higher, the relationship between self-efficacy and self-care maintenance was lower.¹⁵⁶ Together, these examples illustrate the complexity of relationships that can be revealed when moderators are tested.

Conclusion

In this second update to the situation-specific theory of HF self-care, we illustrate that a robust body of knowledge has accumulated on the person-related factors influencing self-care. More research on the contribution of problem-related factors to HF self-care is needed because very few people have only HF and no other chronic conditions. The research on environment-related factors is particularly sparse and in great need of attention. We strongly encourage investigators to consider the interactions of problem, person, and environmental factors influencing HF self-care decision making in future studies.

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