

# Analyzing Heart Failure Care by Actor-Partner Interdependence Model

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Heart failure (HF) is a complex, heterogeneous, increasingly prevalent cardiovascular disorder with high morbidity and mortality. Self-care behaviors are essential for the effective treatment of heart failure, and poor self-care may lead to adverse clinical events in patients with HF, including repeated hospitalizations, poor quality of life, and increased mortality. One of the most common approaches for analyzing data on HF self-care dyads is the Actor–Partner Interdependence Model (APIM). Studies using the APIM approach revealed interrelated patient and caregiver characteristics that influence self-care and explain many complex dyadic behaviors.

Keywords: heart failure ; self-care behaviors ; Actor–Partner Interdependence Model (APIM) ; caregiver

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## 1. Introduction

Heart failure (HF) is a complex, heterogeneous, increasingly prevalent cardiovascular disorder with high morbidity and mortality <sup>[1][2]</sup>. Self-care behaviors are essential for the effective treatment of heart failure, and poor self-care may lead to adverse clinical events in patients with HF, including repeated hospitalizations, poor quality of life, and increased mortality <sup>[3]</sup>. Several factors contribute to adequacy of self-care. Depression <sup>[4]</sup>, sleep disturbances <sup>[5]</sup>, impaired cognition, multiple comorbid conditions <sup>[6]</sup>, and low level of awareness of illness decline all limit self-care <sup>[7]</sup>. The involvement of the partner, i.e., the informal caregiver who assists the patient with daily self-care, is crucial. Caregiver mental health, strain, and contributions to self-care predict patient clinical events in heart failure <sup>[8][9][10]</sup>. A caregiver is often someone very close to the patient, such as a spouse or an adult child, who helps the patient with daily functioning and has the potential to influence the trajectory of this chronic disease. Increasingly, researchers are using a dyadic approach to study self-care in HF because they have realized that self-care is a dyadic phenomenon in which patients and their caregivers are an interdependent team working within their life context and that the way they appraise illness as a team influences management of the disorder <sup>[11]</sup>. HF patients usually have a partner with whom they make day-to-day decisions about symptom management but also about diet and how to deal with worsening symptoms. Dyadic HF research has shown that good relationships with a partner and other people <sup>[12][13]</sup>, knowledge regarding HF of each member of the dyad <sup>[14]</sup>, congruence in symptom assessment, and agreement on who is providing self-care <sup>[15]</sup> influence HF behavior and may determine a patient's outcome. Within this dyad, caregivers influence patient self-care and patients influence caregiver's contribution to self-care. Patients struggle to perform self-care; therefore, the contribution of informal caregivers is fundamental, and a dyadic approach is necessary. Therefore, the dyadic approach to self-care allows a more accurate assessment the factors determining effective self-care in HF by including both the patient and the caregiver <sup>[16]</sup>.

Studies conducted on caregiver participation in self-care in HF and other chronic conditions have shown that taking the caregiver role into account improves patient outcomes. Since HF patients and their caregivers influence each other in self-care, investigators have started to approach self-care studies using dyadic approaches because they allow controlling for the interdependence between patients and caregivers. The theoretical framework for research on dyadic care in HF is a combination of three theories: the Theory of Dyadic Illness Management (TDIM) <sup>[11]</sup>, Situation-Specific Theory of Heart Failure Self-Care (SSTHFSC) <sup>[17][18]</sup>, and the Situation-Specific Theory of Caregiver Contribution to Heart Failure Self-Care (SSTCCHFSC) <sup>[19]</sup>. The TDIM illustrates that management of disease is a dyadic process and describes the interdependency of the patient and the caregiver. The Situation-Specific Theory of Heart Failure Self-Care illustrates the unique aspects of self-care in patients with HF. The Situation-Specific Theory of Caregiver Contribution to Heart Failure Self-Care describes factors influencing caregiver contribution to HF self-care as well as outcomes of this contribution. Research on dyadic self-care in HF focuses on the joint management of this specific disease by the adult patient and caregiver. Many previous studies of self-care in HF have focused on either the patient <sup>[20][21][22][23]</sup> or the caregiver <sup>[9][24]</sup> <sup>[25]</sup>. There are also studies investigating dyads with chronic illnesses, but their focus was more about dyadic appraisal and coping (i.e., spousal involvement and communication between dyadic partners) <sup>[26]</sup>. A dyadic approach to the care of a

patient with HF emphasizes the joint efforts of both members in coping with the disease and the interdependency of the two members of the dyad on effectiveness of HF self-care.

HF is a heterogeneous disease, both in terms of patient health status as well as caregiver experience and tasks. The time required in HF caregiving is highly variable and depends on several factors, including the severity and stability of HF, the presence of comorbidities, impairments to physical and/or cognitive function, the complexity of the treatment regimen, and other situational aspects [27]. During the disease, as the disease advances, the experience of HF becomes characterized by continuous management of progressive and pervasive symptoms (e.g., dyspnea, fatigue, edema, insomnia) that severely compromise the quality of life [18][28]. Additionally, patients with advanced heart failure have an uncertain disease trajectory, and this places a significant burden on heart failure caregivers [29]. Higher levels of comorbid conditions are associated with family caregivers feeling fewer positive feelings about providing care [30], and higher patient with HF functional class (worse symptom severity) is significantly associated with greater caregiver anxiety and general stress [31]. Studies across caregiving contexts suggest that caregivers of patients with more severe illness may need the most support [32][33][34].

## **2. Theory of Dyadic Illness Management**

### **2.1. The Situation-Specific Theory of Heart Failure Self-Care**

The Situation-Specific Theory of HF self-care was created based on real-life experiences of caring for patients with HF. This theory was published in 2008 [17] and then updated in 2016 given recent empirical findings [18]. According to this theory, self-care includes three separate and interrelated processes: maintenance (adherence to recommendations and healthy behaviors, including taking medication, following low-salt diet, and maintaining physical activity), symptom perception (monitoring, detecting, interpreting, and labeling signals from the body), and management (a behavioral response to emerging symptoms). All processes require knowledge and skill, but the most demanding process is management. The SSTHFSC emphasizes that the “naturalistic decision-making” process occurs in real-life situations and dynamic environments with incomplete information, competing needs, time pressure, and high levels of stress due to the potentially life-threatening nature of the event. Patient decisions in self-care in HF are based on both objective data (e.g., weight gain) and subjective data (e.g., fatigue). The SSTHFSC identifies several factors that influence self-care decisions, including person-related factors (e.g., cultural identity, health literacy, socioeconomic status), problem-specific factors (e.g., co-morbidities, including cognitive impairment), and environmental factors (e.g., lack of social support). Given these factors, self-care decisions made by patients sometimes are inconsistent and even wrong.

### **2.2. The Situation-Specific Theory of Caregiver Contribution to HF Self-Care**

The Situation-Specific Theory of Caregiver Contribution to HF Self-Care is based both on the SSTHFSC and the Middle Range Theory of Self-Care of Chronic Illnesses [35] and describe factors at caregiver (e.g., age), patient (e.g., cognition), and dyadic level (e.g., the relationship between the patient and the caregiver) that influence the extent to which caregivers contribute to support HF patient self-care. Similar to the SSTHFSC, caregiver contributions to HF self-care include the dimensions of caregiver contribution to self-care maintenance, symptom monitoring, and perception and self-care management. In addition, the theory includes a mediator, which is the caregiver's self-efficacy that mediates the relationship between the contributors and caregiver contributions to self-care, and the outcomes, which can be related to patient (e.g., quality of life) and caregiver (e.g., self-esteem).

### **2.3. The Actor–Partner Interdependence Model**

The interdependency between the patient and the caregiver needs to be taken into consideration when analyzing data on dyads. The Actor–Partner Interdependence Model (APIM) is the most current methodology for analyzing data on HF self-care dyads. The APIM is based on the Interdependence Theory [36], which assumes that people influence each other's experiences by interacting with each other. Researchers emphasize the need to analyze the characteristics of both patient and caregiver since they are in a mutual, long-term interaction, and their reactions to events are dependent on each other. The APIM model for HF dyadic care studies is usually supported by paired regression analyses of the relationship within the couple, i.e., a regression method that does not require independent observations. The APIM model specifies how the independent variable of an individual may impact their own dependent variable (actor effects) as well as the partner's dependent variable (partner effects) [37]. There are three types of variables in the APIM model: (1) between-dyads variables, (2) within-dyads variables, and (3) mixed variables. Between-dyads variables are those that vary across dyads but are the same for both members of the dyad (e.g., years spent in a relationship). A within-dyads variable varies across the members of the dyad, but each dyad would have the same total score as all other dyads (e.g., if the study consists only of heterosexual couples, this variable will be gender: male and female). A mixed variable is one that has variation

both within and between dyads (e.g., age of members). It is possible to estimate actor and partner effects for mixed variables only. Between- and within-dyads variables can be estimated as main effects. Additionally, various interactions can be tested based on the model [38]. An extended model of the APIM, the Actor–Partner Interdependence Mediation Model (APIMeM), allows to assess mediation in dyadic data [39].

To date, there has been little consistency in how data on HF care dyads have been analyzed. As mentioned above, researchers suggest analyzing dyadic data with the APIM model because it takes interactions between dyadic partners into consideration. In recent studies, APIM has been shown to be effective in identifying the determinants of effective dyadic coping with HF. Many scholars emphasize the need to continue using this method of analysis [9][28][29]. Since dyadic analysis is becoming a new approach to studying HF self-care, a systematic review of these studies would help orientate future studies on this topic.

## **3. Analyzing Heart Failure Care by Actor-Partner Interdependence Model**

### **3.1. Quality of Life and Emotional Aspects of Dealing with HF**

Analysis of the dyadic studies demonstrates that managing HF can be very emotional for both the patient and the caregiver [40]. Both partners in the dyad experience high levels of emotional distress [41]; however, patients seem to experience more depressive symptoms than their spouses [42][43]. Greater emotional distress has been associated with poor quality of life. Two studies focused on the caregiver and provided evidence that quality of life of the patient is better if the care partner has no depressive symptoms or anxiety [40][41]. Sleep also is particularly important for caregivers. It has been empirically demonstrated that the presence of sleep disorders significantly affects the mental health of the caregiver [44]. What positively affects the caregiver's quality of life is the patient's adherence to therapy [45]. Better emotional well-being of the dyad also is associated with better relationship quality [42]; however, having a good relationship is not "protective" against anxiety and depression for caregivers [46]. If either member of the dyad senses that they are not in control over HF, the emotional well-being of the dyad may become worse [47]. Incongruent collaboration of partners in HF management also affects the emotional well-being of the dyad [43]. Studies on emotional state and quality of life in dyadic caring in HF conclude that interventions are needed to alleviate depressive symptoms in both dyadic partners [40][41]. It appears that nurses can increase dyadic caring by providing the dyadic partners with social support [48].

### **3.2. Dyadic HF Self-Care Confidence**

Self-care confidence, or self-care self-efficacy, is the extent to which one feels able to perform regular self-care (patient) and contribute to patient self-care (caregiver) despite difficulties [49]. Research on dyadic self-care has shown that poor self-efficacy affects the ability of the patient and caregiver to engage. Patients with greater self-care confidence are more engaged in self-care behaviors [50]. Studies on dyadic care in HF also show that self-care confidence is not typically equal between the members of the dyad, with caregivers demonstrating greater self-care confidence than patients [46]. However, there has also been heterogeneity in confidence across the dyads, suggesting self-care confidence is adequate in some dyads but is insufficient to support self-care in others [46].

### **3.3. Maintenance and Management**

Data from APIM studies show low levels of daily HF maintenance and management in both partners in HF self-care [49][51]. Not surprisingly, mild cognitive impairment in the patient reduces self-care [51]. Better self-care maintenance is usually achieved in dyads where the caregiver is a woman. Indeed, there is evidence that female gender of the caregiver was a significant predictor of better patient self-care maintenance [51]. This most likely arises from a traditional role of women, who mainly care about family health in many societies. There also is evidence that a caregiver is more likely to contribute to HF self-care management if the caregiver is not the patient's spouse [51]. Involvement in self-care also is associated with the emotional state of the caregiver, the quality of the relationship between the HF patient and the caregiver [49][52][53], and the caregiver's knowledge of self-care [49]. Patients are more adherent to recommendations when they have a decreased physical quality of life [45]. It seems, therefore, that a greater problem in engaging patients in self-care may arise in patients with a relatively high physical quality of life. Furthermore, an agreement between dyad partners who are responsible for performing self-care tasks may also be an important issue for self-care. Dyads that were congruent not only reported fewer psychosocial problems [54], but also in these dyads, the caregivers were more engaged in caregiving [49].

## 4. Conclusions

(1) a family-oriented approach can improve the functioning of a patient with heart failure condition, and (2) social support from caregivers significantly enhances patients' adaptation to illness. The emerging view is that patient–caregiver interconnections are still enigmatic, and more studies are needed to provide a more complete and coherent picture of self-care in HF. Thus, further research should be carried out to clarify this concept and identify the most critical factors for effective dyadic functioning in HF.

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