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The contribution of living arrangements, social support, and self-efficacy to self-management behaviors among individuals with heart failure: A path analysis

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Abstract

Background: Living arrangements, social support, and self-efficacy have significant implications for self-management science. Despite the theoretical linkages among the three concepts, there is limited empirical evidence about their interplay and the subsequent influence on heart failure (HF) self-management.

Objective: To validate components of the Individual and Family Self-Management Theory among individuals with HF.

Methods: This is a secondary analysis of cross-sectional data generated from a sample of 370 individuals with HF. A path analysis was conducted to examine the indirect and direct associations among social environment (living arrangements), social facilitation (social support) and belief (self-efficacy) processes, and self-management behaviors (HF self-care maintenance) while accounting for individual and condition-specific factors (age, sex, race, and HF disease severity).

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Results: Three contextual factors (living arrangements, age, and HF disease severity) had direct associations with perceived social support and self-efficacy, which in turn were positively associated with HF self-management behaviors. Living alone ($\beta = -.164$, $P = .001$) was associated with lower perceived social support while being an older person ($\beta = .145$, $P = .004$) was associated with better support. Moderate to severe HF status ($\beta = -.145$, $P = .004$) or higher levels of perceived social support ($\beta = .153$, $P = .003$) was associated with self-efficacy.

Conclusions: Our results support the Individual and Family Self-Management Theory, highlighting the importance of social support and self-efficacy to foster self-management behaviors for individuals with HF. Future research is needed to further explore relationships among living arrangements, perceived and received social support, self-efficacy, and HF self-management.

Keywords

Heart failure; self-management; social support; living arrangements; nursing theory

Introduction

In the United States, 6.5 million Americans are living with heart failure (HF), and the prevalence of HF is projected to affect more than 8 million Americans by 2030.¹ Heart failure self-management is essential to attenuate the symptom burden and maintain the quality of life for individuals living with HF.² Yet, as the disease severity progresses, individuals with HF often experience physical and cognitive limitations that interfere with their ability to manage the disease without the assistance of others.³⁻⁵ As a result, social support, broadly defined as the health-promoting instrumental, emotional, and informational assistance that individuals receive from family members, friends, and others,⁶ is recognized as an influential contributor to effective HF self-management.⁷ Social support is a modifiable target that can contribute to sustaining self-efficacy and HF self-management behaviors.

In the extant literature, social support is operationalized by a variety of definitions, resulting in conceptual ambiguity and heterogeneity in the evidence of its impact on HF self-management. Social support has structural and functional dimensions and has been predominantly operationalized by proxy measures that assess the existence of relationships or the extent to which social relationships provide certain resources.⁸ Therefore, structural support refers to the assessment of social connections that individuals have in their social environment (e.g., marital status, social network, living arrangements), whereas functional support is captured using validated instruments that assess the level of perceived or received support.⁹ In this article, the term social support is used to refer to the functional dimension of support, which is the extent of support provided by social resources.⁸ In the context of HF self-management, living arrangements have emerged as a structural indicator of social support that is linked with HF self-management behavior.¹⁰

The social environment refers to the social setting in which people live and interact.¹¹ Therefore, living arrangements, whether an individual resides with another person or not, have shown to be a valid assessment of an individual's social environment, and its influence

on self-management behaviors has been established. In a meta-analysis of social support and patient adherence, DiMatteo¹² established that living with another person had a positive influence on patient adherence to treatment recommendations. In the context of HF, living arrangements can have a more substantial contribution to self-management behaviors when compared to marital status.¹³ Living alone is a significant predictor of developing depressive symptoms,¹⁴ which negatively influences self-management behaviors.² On the other hand, living with someone buffers the negative influence of depressive symptoms on HF self-management.¹⁰ Therefore, sharing a living space with someone (e.g., a spouse, friend, adult child, nonrelative) indicates an opportunity for a meaningful relationship and mutual assistance to maintain healthy behaviors and manage chronic conditions.

Social facilitation is a mechanism that occurs within social relationships and enhances an individual's capacity to engage in healthy behaviors and self-management, and includes the concept of social support.¹⁵ Across studies, individuals living with HF who have high levels of social support have better health and healthcare outcomes.⁷ Other researchers^{4,16} reported that individuals with HF who have high levels of social support have greater engagement in self-monitoring behaviors (e.g., fluid intake and weight) and higher rates of medication adherence. Additionally, when individuals with HF have high levels of social support, they have lower rates of adverse cardiovascular events^{17,18} and better quality of life¹⁹⁻²³ compared to individuals with little social support. Social support is posited to have a positive influence on self-management behaviors by improving the individual's self-efficacy,²⁴⁻²⁸ known as the belief in one's ability to organize and execute a course of action needed to accomplish a specific task.²⁹

Social environment and social facilitation have substantial influence on the health of individuals with HF. Despite the existing theoretical linkage between the concepts of social environment and social facilitation,¹⁵ there's limited empirical evidence about the association between living arrangements and social support. Additionally, the behavioral benefits of the interplay between social environment, social facilitation, and self-efficacy beliefs are not well-established. Guided by the Individual and Family Self-Management Theory,¹⁵ we hypothesized a conceptual model that accounts for the indirect and direct effects of social environment (i.e., living arrangements), social facilitation (i.e., social support), and beliefs (i.e., self-efficacy) on self-management behaviors (i.e., HF self-care maintenance), while accounting for individual and condition-specific factors^{17,25,30-32} (i.e., age, sex, race, and HF disease severity) (Figure 1). The application of the Individual and Family Self-Management Theory is inclusive of contextual and psychosocial factors that influence self-management behaviors across clinical populations, providing a broader perspective on HF self-management than HF-specific models of self-care.³³ Therefore, the purpose of this study was to validate components of the Individual and Family Self-Management Theory in individuals with HF.

Methods

Design

This study was a secondary analysis of data generated by a longitudinal descriptive study, referred to as the Heart Failure Adherence, Behavior, and Cognition (Heart ABC) study.⁴

The primary aim of heart ABC was to assess the relationships among cognitive impairment and self-management behaviors in individuals with HF.^{4,34,35} A more detailed description of the parent study has been presented in previous reports.^{4,34,35} For this study, de-identified data from the baseline study appointment were used to assess the hypothesized relationships among the study variables.

Sample

A total of 372 participants were enrolled in the parent study. Individuals were eligible if they were aged 50 to 85 years old, had a systolic HF diagnosis (ejection fraction < 40%) for at least 3 months, and were classified by their physician as New York Heart Association (NYHA) class II or III at the time of recruitment. Individuals were excluded if they had a history of cardiac surgery within the last 3 months, acute or chronic neurological disorder, a severe psychiatric condition with cognitive impairment, end-stage renal disease, untreated obstructive sleep apnea, substance abuse within the past 5 years, or enrolled in an HF telemonitoring program. In the present study, participants with complete data on key measures of interest based on the hypothesized model (Figure 1) were included, yielding a final sample of 370 individuals with HF. Two participants from the parent study were excluded because they had missing data on some of the measures of interest.

Measures

Contextual Factors.—Living arrangements were determined based on participants' report of whether they were living alone or with someone (e.g., spouse, family member, or friend). Data on individual and condition-specific factors (i.e., age, sex, race, HF disease severity) were collected using a self-report questionnaire. Disease severity was estimated using NYHA functional classification and data were collected based on participants' self-report of their current symptoms and functional limitations. The NYHA classification data were collected at the first study appointment and were not based on the physician's NYHA classification used for inclusion criteria determination during recruitment. The categorical contextual variables (living arrangements, race, and disease severity) were recoded into binary variables.

Self-Management Processes.—Social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS),³⁶ a 12-item questionnaire that assesses an individual's perception of the availability of family, friends, and significant others as resources to help provide instrumental assistance or psychological support. Items of the MSPSS are rated on a 7-point Likert scale and range from 1 (very strongly disagree) to 7 (very strongly agree). A total score is summed (range: 12 to 84) and higher scores reflect higher states of perceived social support. This scale is widely used in HF research^{17,19-21,26} and its reliability and construct validity has been recently established in an HF population.³⁷ The Cronbach's alpha from previous studies^{17,19-21} ranged from 0.85 to 0.95, and was 0.95 in this study.

Self-efficacy was measured using the 6-item self-care confidence scale of the Self-Care of Heart Failure Index v.6 (SCHFI).³⁸ This scale assesses the perceived ability to perform HF self-management behaviors. Items are measured on a 4-point Likert scale ranging from 1

(not confident) to 4 (extremely confident). Responses are standardized to range from 0 to 100, with higher scores reflecting higher self-efficacy. Internal consistency of the self-care confidence scale ranged from 0.84 to 0.90 using a variety of indices.³⁹ In this study, internal consistency was demonstrated by a Cronbach's alpha coefficient of 0.85.

Self-Management Outcome.—HF self-management behaviors were assessed using the self-care maintenance scale of the SCHFI,³⁸ a 10-item questionnaire that evaluates treatment adherence (e.g., daily weighing) and symptom monitoring on a 4-point Likert scale ranging from 1 (never or rarely) to 4 (always or daily). Scores are standardized to range from 0 to 100, with higher values indicating better self-management behaviors. The SCHFI is widely used to assess HF self-management, and the Cronbach's alpha of the self-care maintenance scale is reported as 0.55³⁸ and was similar in the current study. The measure of reliability used in this study failed to reach the acceptable threshold likely due to the multidimensionality of the self-care maintenance scale of the SCHFI.³⁹

Procedure

Participants were recruited from inpatient and outpatient cardiology practices at 2 hospital systems in Northeast Ohio between August 2010 and October 2013. The institutional review boards of Kent State University, Summa Health Systems Incorporated, and University Hospitals Cleveland Medical Center approved all study procedures. Following recruitment and written informed consent, a trained research assistant administered a series of self-report questionnaires assessing demographic and psychosocial factors, and completed neuropsychological testing during 4 home visits over a 5- to 8-week period.

Data Analysis

The data were analyzed using IBM Corporation Statistical Package for Social Sciences (SPSS; version 25, Armonk, NY: IBM Corporation) and Analysis of Moment Structures (AMOS, version 25, Armonk, NY: IBM Corporation). The data analysis was completed in 3 stages. In the first stage, univariate and descriptive statistics were analyzed and cases with values missing for the variables of interest were removed in a list-wise fashion. Second, the reduced dataset was evaluated for violations of the statistical assumptions for linear regression; no violations were found. Third, the path analysis in AMOS was conducted specifying a recursive mediational structural model reflecting the indirect and direct paths of the hypothesized model (Figure 1). In the hypothesized model, paths were drawn to connect all of the context, process, and outcome variables. The manifest variables of the structural model were tested using a covariance matrix and full maximum likelihood estimation. This statistical approach provides a simultaneous multivariate assessment of relationships among the endogenous and exogenous variables of interest. The initial model was refined by removing paths to improve the model fit and identify the most parsimonious model that was both consistent with theory and prior empirical evidence and fit the data. Paths were eliminated, starting with the path with the largest *P*-value moving to smallest, with each path evaluated for consistency with prior empirical and theoretical knowledge.⁴⁰ Additionally, model fit was evaluated after each path removal until acceptable model fit was achieved. Model fit was evaluated by achieving Tucker-Lewis index (TLI) and comparative fit index (CFI) values > .90 and root mean square error of approximation (RMSEA) and standardized

root mean square residual (SRMR) values $< .08$.⁴¹ The statistical significance of all analyses was determined at the level of $P = .01$.

Results

Sample Characteristics

The mean age of participants was $68.5 (\pm 9.5)$ years, 59.5% were men, most were White (71.9%), lived with someone (74.1%), and most had moderate to severe HF (NYHA class III/IV; 67.3%) (See Table 1). Enrolled participants were classified by their physician as NYHA class II or III at the time of recruitment, but some were categorized as class I (9.5%) or IV (5.1%) at baseline, reflecting instability in their self-reported symptoms and functional limitations. On average, participants had poor self-management behaviors and low self-efficacy as indicated using the established SCHFI cut point of 70,³⁸ reflecting adequate self-management (self-care maintenance 62.9 ± 15.4 and confidence 62.8 ± 20.4).

Path Analysis of the Hypothesized Model

The initial hypothesized path model poorly fit the data and several original paths were sequentially removed to generate the final model (see Table 2 with steps of model trimming). Based on our approach to model specification and pruning and using an *a priori* level of significance ($P = .01$), we removed 12 non-significant paths and eliminated 2 contextual variables (race and sex). The final model had acceptable fit indices and is presented in Figure 2. Three contextual variables (living arrangements, age, and disease severity) were associated with social support and self-efficacy processes, which in turn were positively associated with self-management behaviors.

Influence of contextual factors on self-management processes.—Living arrangements and age had direct associations with social support. Living alone ($\beta = -.164$, $P = .001$) was associated with lower social support; whereas being an older person ($\beta = .145$, $P = .004$) was associated with higher social support. Disease severity and social support had direct associations with self-efficacy. Having less severe HF ($\beta = .145$, $P = .004$) or perceiving higher levels of social support ($\beta = .153$, $P = .003$) was associated with better self-efficacy.

Influence of contextual factors and self-management processes on self-management behaviors.—None of the contextual variables (living arrangement, age, and disease severity) were directly associated with self-management behaviors. The influence of contextual factors on self-management behaviors was through the process variables: social support and self-efficacy. For instance, living arrangements had an indirect association with self-management behaviors through social support (see Table 3 for indirect effects).

Social support ($\beta = .129$, $P = .008$) and self-efficacy ($\beta = .337$, $P < .001$) had direct associations with self-management behaviors. Social support was also an indirect predictor of self-management behaviors, which was indicative of self-efficacy being a mediator between social support and self-management behaviors.

Discussion

In this cross-sectional study, we used the Individual and Family Self-Management Theory to examine the indirect and direct associations among social environment, social facilitation and belief processes, and HF self-management behaviors, while accounting for individual and condition-specific factors. Based on our final well-fitting model, the Individual and Family Self-Management Theory can serve as a framework for understanding key factors essential to self-management in individuals with HF. The individual's living arrangements, age, and disease severity were indirectly associated with HF self-management behaviors through psychosocial processes (social support and self-efficacy).

The relationship between living arrangements and social support is consistent with previous findings that highlight the association between living alone and low levels of social support.^{17,22,42} Living arrangements are considered a structural property of social relationships, while social support is the process through which this structure may have its effect.⁴³ Therefore, the status of living with someone was associated with a higher perception of social support, which served as a mechanism to positively influence HF self-management behaviors. Similarly, Gallagher and colleagues¹⁶ found that individuals with HF gained the most benefits when they had a partner who provided a high level of quality support. The evidence base on informal caregivers' contribution to HF management is emerging.⁴⁴

Recently, Vellone and colleagues⁴⁵ proposed a Situation-Specific Theory of Caregiver Contributions to Heart Failure Self-Care to aggregate existing knowledge on this topic and guide future studies. In this theory, the authors presented patient, caregiver, and dyadic factors that influence the contributions provided by caregivers to HF self-management. Other investigators have emphasized the dyadic approach to HF management that aims to improve health outcomes for both patients and caregivers.⁴⁶ In a dyadic context, the type of dyadic relationship (e.g., spouse, child, other relative, friend)^{47,48} and the quality of the relationship^{47,49-51} were linked to varying degrees of engagement in HF self-management for both care partners. Yet, little is known about the link between the coresidence status of dyads and their level of engagement in self-management behaviors.

Living arrangements had an indirect effect on HF self-management behaviors through social support. Our findings suggest that the potential connections that individuals with HF have with others in their social environment, specifically their living space can contribute to engagement in self-management behaviors. Nevertheless, caregivers do not always live with the patient. Therefore, there is a need to identify whether caregivers living with patients provide a different type, amount, or quality of HF management support compared to those who do not live with patients with HF. Moreover, it is important to assess how individuals with HF respond to contributions of coresiding and non-coresiding caregivers. Consequently, interventions can be developed to mobilize existing support systems within and/or outside of a person's household.

In our analysis, we focused on living arrangements as an assessment of the social environment to capture the potential contribution of any coresiding caregiver to HF self-management. In support of the importance of coresidence status, Müller and colleagues⁵²

demonstrated that those who have a coresiding partner have better mental and physical health, compared to those not sharing a home with a partner. Moreover, there is emerging evidence about the association between relationship quality and health behaviors and outcomes in adults with HF.^{50,53} Therefore, the relationship between living arrangements, relationship quality, and HF self-management is also worth exploring.

Besides living arrangements, we found a significant direct association between age and social support, which is consistent with previous findings in individuals with HF.¹⁸ There may be other influential variables that may not have shown to meet statistical significance in our sample and were not accounted for in the final model. For instance, sex was not a significant predictor of social support. Nevertheless, men and women report different types of social relationships and support,⁵⁴ and the influence of social support on health outcomes may differ between men and women with HF.³¹

Based on our findings, social support had a direct effect on self-management behaviors, as well as an indirect effect through self-efficacy. This is consistent with the existing literature that supports the mediating effect of self-efficacy on the relationship between social support and HF self-management.^{24,25,27,28} House and colleagues⁴³ proposed a behavioral mechanism to explain the influence of social relationships on health outcomes. People with higher levels of social support are more likely to receive positive reinforcement for health-promoting behaviors and coping strategies in stressful situations, which fosters their self-efficacy to manage their condition. Similarly, in a recent study, researchers²⁶ established that those with greater support had better self-efficacy, but those with specifically less instrumental support had a greater increase in self-efficacy over time. Therefore, individuals with HF would benefit from improved self-efficacy when social support is not limiting their autonomy.

According to the Individual and Family Self-Management Theory, social facilitation and beliefs are interrelated processes that explain the influence of contextual factors on self-management outcomes. Our study supports the theory's posited relationship between self-management processes and self-management behavior, and provides evidence of the linkage between social support and self-efficacy and their influence on HF self-management. Despite our initial conceptualization based on a broad theoretical perspective of self-care, the final model aligned fairly well with the revised and updated Situation Specific Theory of Heart Failure Self-Care.³³ Therefore, the two different theoretical approaches to conceptualizing HF self-management have many commonalities, which further supports the application of a mid-range self-management theory to the heart failure population.

There are limitations to this study. First, the use of cross-sectional data precludes us from making definitive causal statements about the relationships among contextual factors, processes, and self-management behaviors. Future longitudinal studies are needed to evaluate these relationships over time and establish potential causal associations. Second, we were limited to the measures available in the parent study and did not have an assessment of the actual support that participants received. Moreover, we evaluated "social environment" using a simple measure of living arrangements, which may have limited validity. Last, although we had a diverse sample, participants may not be representative of the larger

population of patients with heart failure. The relationships among the study concepts may be different in younger or newly diagnosed non-participants and in those with more severe HF. Moreover, our findings have limited generalizability to vulnerable subgroups given that the existing link between racial minority status and social support and HF self-management^{17,25,32} was not supported by our findings. Despite these limitations, this study is, to our knowledge, the first to test the Individual and Family Self-Management Theory among individuals with HF. Our findings suggest taking into consideration the availability (living arrangements) as well as adequacy of social relationships when examining HF behavioral outcomes.

Conclusions

In this study, we examined the contribution of social environment, social facilitation, and beliefs to HF self-management. Our findings highlight the importance of social support as a mechanism by which living arrangements affect HF self-management behaviors. Moreover, we confirmed that self-efficacy partly explains the relationship between social support and HF self-management. Future research is needed to further explore the social environment of individuals with HF and key components of social facilitation to examine relationships with perceived and received social support. Interventions need to be developed targeting informal caregivers of individuals with HF to foster HF management support and improve health outcomes.

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Figure 1: Hypothesized Model of Heart Failure Self-Management Based on the Individual and Family Self-Management Theory and the existing literature.
Abbreviation: NYHA, New York Heart Association

Figure 2: Final Model of Heart Failure Self-Management.

Note: Standardized coefficients are provided above each path and the explained variance (R^2) of each endogenous variable is provided above each box. Model fit indices: $\chi^2 = 17.565$ ($df = 9$, $P = .041$), Tucker–Lewis index = .851, comparative fit index = .911, root mean square error of approximation = .051, and standardized root mean square residual = .051.

* $P < .01$. ** $P < .001$.

Table 1:

Sample Characteristics (n = 370)

Variable	Mean $\pm$ SD or n (%)
Age (years)	68.5 $\pm$ 9.5
Male	220 (59.5)
White	266 (71.9)
Education level	
High School or less	147 (39.7)
Some College (1-4 years)	150 (40.5)
Graduate/Professional education	35 (9.5)
Trade or technical	38 (10.3)
Marital status	
Never Married	22 (5.9)
Married	206 (55.7)
Widowed	65 (17.6)
Separated	9 (2.43)
Divorced	68 (18.4)
Living alone	96 (25.9)
Social Support (MSPSS) (12 – 84)	69.6 (13.7)
Charlson Comorbidity Category	
Low (1-2)	136 (36.8)
Moderate (3-4)	154 (41.6)
High (5)	80 (21.6)
NYHA Class III/IV	249 (67.3)
Functional ability (DASI) (0 – 58.2)	32.9 $\pm$ 15.0
Self-care maintenance (SCHFI) (0 – 100)	62.9 $\pm$ 15.4
Self-care confidence (SCHFI) (0 – 100)	62.8 $\pm$ 20.4

Abbreviations: DASI, Duke Activity Status Index; MSPSS, Multidimensional Scale of Perceived Social Support; NYHA, New York Heart Association; SCHFI, Self-Care of Heart Failure Index.

Table 2:

Path Analysis Steps with Fit Indices

Path Model Changes	χ^2	df	P	TLI	CFI	RMSEA	SRMR
Hypothesized model	73.442	10	.000	-.090	.611	.131	.078
Removed path between age and self-efficacy	73.476	11	.000	.024	.617	.124	.078
Removed path between sex and self-efficacy	73.554	12	.000	.119	.622	.118	.078
Removed path between disease severity and self-care maintenance	74.084	13	.000	.193	.625	.113	.078
Removed path between living arrangements and self-care maintenance	74.864	14	.000	.253	.627	.109	.079
Removed path between race and self-efficacy	75.891	15	.000	.303	.626	.105	.079
Removed path between race and social support	77.344	16	.000	.341	.624	.102	.080
Removed path between age and self-care maintenance	78.979	17	.000	.374	.620	.099	.081
Removed path between sex and self-care maintenance	81.885	18	.000	.390	.608	.098	.081
Removed path between race and self-care maintenance	27.893	12	.006	.756	.861	.060	.052
Removed path between living arrangements and self-efficacy	31.680	13	.003	.735	.836	.062	.056
Removed path between disease severity and social support	36.749	14	.001	.701	.800	.066	.061
Removed path between sex and social support	17.565	9	.041	.851	.911	.051	.051

Abbreviations: CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual; TLI = Tucker-Lewis index.

Table 3:

Indirect Effects of Living arrangements, Social Support, and Self-Efficacy on Heart Failure Self-Management Behaviors

Path	Standardized Estimate	Standard Error	P value
Living arrangements → social support → self-efficacy → self-care maintenance	.195	.010	.017
Living Arrangements → social support → self-care maintenance	.421	.021	.010
Social support → self-efficacy → self-care maintenance	.024	.001	.029