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A Dyadic Approach to Managing Heart Failure with Confidence

Abstract

Background: The majority of heart failure (HF) self-care research remains focused on patients, despite the important involvement of family caregivers. Although self-care confidence has been found to play an important role in the effectiveness of HF self-care management on patient outcomes, no known research has examined self-care confidence within a dyadic context.

Objective: The purpose of this study was to identify individual and dyadic determinants of self-care confidence in HF care dyads.

Methods: Multilevel modeling, which controls for the interdependent nature of dyadic data, was used to examine 329 Italian HF dyads (caregivers were either spouses or adult children).

Results: Both patients and caregivers reported lower-than-adequate levels of confidence, with caregivers reporting slightly higher confidence than patients. Patient and caregiver levels of confidence were significantly associated with greater patient-reported relationship quality and better caregiver mental health. Patient confidence in self-care was significantly associated with patient female gender, nonspousal care dyads, poor caregiver physical health, and low care strain. Caregiver confidence to contribute to self-care was significantly associated with poor emotional quality of life in patients and greater perceived social support by caregivers.

Conclusions: Findings are supportive of the need for a dyadic perspective of HF self-care in practice and research as well as the importance of addressing the needs of both members of the dyad to maximize optimal outcomes for both.

Disciplines

Behavioral Medicine | Cardiology | Cardiovascular Diseases | Circulatory and Respiratory Physiology | Medical Humanities | Medicine and Health Sciences | Nursing | Preventive Medicine

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A Dyadic Approach to Managing Heart Failure with Confidence

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Abstract

Background: The majority of HF self-care research remains focused on patients, despite the important involvement of family caregivers. Although self-care confidence has been found to play an important role in the effectiveness of HF self-care management on patient outcomes, no known research has examined self-care confidence within a dyadic context. **Objective:** The purpose of this study was to identify individual and dyadic determinants of self-care confidence in HF care dyads. **Methods:** Multilevel modeling, which controls for the interdependent nature of dyadic data, was used to examine 329 Italian HF dyads (caregivers were either spouses or adult-children). **Results**: Both patients and caregivers reported lower than adequate levels of confidence, with caregivers reporting slightly higher confidence than patients. Patient and caregiver levels of confidence were significantly associated with greater patient-reported relationship quality and better caregiver mental health. Patient confidence to self-care was significantly associated with patient female gender, non-spousal care dyads, poor caregiver physical health, and low care strain. Caregiver confidence to contribute to self-care was significantly associated with poor emotional quality of life in patients and greater perceived social support by caregivers. **Conclusions**: Findings support the need for a dyadic perspective of HF self-care in practice and research, and the importance of addressing the needs of both members of the dyad to maximize optimal outcomes for both.

Keywords: heart failure; dyads; confidence, relationship quality, caregiver mental health.

A Dyadic Approach to Managing Heart Failure with Confidence

Self-care is critical to the effective management of heart failure (HF) and is linked directly with patient-oriented and clinical outcomes.[1] Health care providers often rely upon family members (primarily spouses and adult-children) to engage in the maintenance and management of the patient's HF, especially when the patient's cognitive or physical impairment is severe.[2] Although we have begun to understand the impact of HF on family caregivers and their role in patient outcomes,[3-5] the majority of HF research remains focused on the patient. There is some evidence that HF care dyads who share responsibility and take a collaborative approach to self-care have better dyadic and patient outcomes[6,7] and that high levels of caregiver confidence in the patient's ability to engage in self-care is associated with positive patient outcomes.[5,8] However, without a concerted effort to focus on the HF dyad as the unit of analysis using appropriate methodologies, the way HF patients and caregivers work together and impact one another will continue to be overlooked (i.e., the relational aspect of self-care).[7,9]

The Riegel model of HF self-care[10] purports a naturalistic decision-making process that encompasses a) routine behaviors to maintain physiologic homeostasis (self-care maintenance) and b) evaluation and response to symptoms when they occur (self-care management). The confidence to perform such self-care (i.e. self-care confidence) has been theorized to moderate the effect of self-care maintenance and management on patient outcomes in HF,[10] and found to play an important role in the effectiveness of HF self-care management on patient outcomes.[10-12] Thus, identifying determinants of HF self-care confidence is one pivotal way to minimize adverse consequences of HF.

Patient self-care confidence has been found to be higher in patients with more education,[13] lower illness severity,[5,13,14] a more recent diagnosis,[13] fewer comorbidities,[13] and

better physical and mental health.[5,11,14-16] Moreover, patient self-care confidence is higher when the caregiver has better mental health,[8] and when either the patient or caregiver rates the quality of their relationship as high.[8,17] The determinants of HF caregiver self-care confidence are unknown. In non-HF illness contexts, however, caregiver confidence has been associated with caregiver strain and mental health and patient physical health.[18,19]

Given the importance of HF self-care confidence in achieving optimal outcomes, the familial context of HF self-care,[20] and the high levels of strain and psychological distress among HF caregivers,[4,21-23] there is a pressing need to focus on the HF dyad to identify modifiable factors that are associated with better outcomes for both the patient and caregiver. To date, few studies in HF have focused on the dyad as the unit of analysis,[17,24-27] and even fewer have used methodologies that appropriately control for the interdependent nature of dyadic data.[9,28] Accordingly, the purpose of this study was to identify individual and dyadic determinants of patient and caregiver HF self-care confidence using multilevel modeling. We hypothesized that patient-, caregiver- and dyadic-level factors would be significant in explaining variability in self-care confidence of both HF patients and their spouse or adult-child caregivers.

Methods

Design, Sample, and Setting

The present study was a secondary analysis of a cross-sectional study of Italian HF patients and their caregivers.[29] A convenience sample of 1,192 HF patients was enrolled from outpatient centers across 28 Italian provinces. HF patients were included if they were 18 years of age or older, had a confirmed diagnosis of HF via echocardiographic and clinical evidence according to the diagnostic criteria specified by the European Society of Cardiology,[30] and were

considered stable (i.e., no acute coronary event in the previous 3 months). Patients with overt dementia were excluded. Caregivers who accompanied the patient to enrollment and were designated by the HF patient as the primary caregiver were also invited to participate. Patients and caregivers who were willing and eligible to participate provided written informed consent and completed the survey at the time of the outpatient visit. Data collection was overseen by nurses trained in the study protocol, who provided assistance to patients when needed. Patients and caregivers completed the surveys separately.

A total of 382 HF dyads had available data for the current analysis. Due to the important role differences between spouse and adult-child caregivers, the present analysis purposely focused on the 329 (86%) HF dyads that comprised a spouse or adult-child caregiver (excluded dyads consisted of other relatives, friends, and formal caregivers). The study was approved by the institutional review boards at each outpatient center where recruitment took place. Additionally, the current analysis was determined by the Oregon Health & Science University IRB to be exempt (due to adequate de-identification of data).

Measures

Patient and Caregiver Self-Care Confidence

Patient confidence was measured using the Italian version of the six-item confidence subscale of the Self-Care of HF Index v.6.2 (SCHFI).[31] Patients rate their ability to engage effectively in self-care on a 4-point scale. Standardized scores are calculated (range 0–100) with higher scores indicating greater confidence in their ability to keep free of HF symptoms, follow the treatment advice they have been given, evaluate the importance of HF symptoms, recognize changes in their health if they occur, do something that will relieve HF symptoms, and evaluate how well a remedy works. The subscale has demonstrated good reliability and validity in this

population.[31] Caregiver confidence was measured using the six-item confidence subscale of the

Caregiver Contribution to Self-care of Heart Failure Index (CC-SCHFI),[32] a measure derived

from the SCHFI. Caregivers rate their confidence in their ability to contribute to the patient's

self-care. Standardized scores are calculated (range 0–100) with higher scores indicating greater

confidence in their ability to keep the patient free of heart failure symptoms, follow the given

treatment advice, evaluate the importance of symptoms, recognize changes in the patient's health

when they occur, do something that will relieve the patient's symptoms, and evaluate how well a

remedy works. The subscale has demonstrated good reliability and validity in the Italian

population.[32]

Patient Cognitive Impairment

Patient cognitive impairment was measured using the Mini Mental State Examination

(MMSE).[33] The MMSE assesses orientation to time, attention and calculation, delayed recall,

and language and visual construction. Scores on the MMSE range from 0 to 30, with lower

scores indicating more cognitive impairment. The MMSE is the most widely used measure of

mental status with good psychometric properties.[34]

Patient and Caregiver Physical and Mental Health

Patient physical and quality of life were measured using subscales from the 21-item

Minnesota Living with Heart Failure Questionnaire (MLHFQ).[35] The MLHFQ is a condition-

specific instrument; item responses range from 0 (none) to 5 (very much). Higher scores indicate

worse physical and emotional quality of life. The measure has demonstrated strong reliability.[36]

Cronbach's α in the present study was 0.89. Caregiver physical and mental health were

measured using the two subscales from the SF-12 health survey.[37] Scores on each component are

standardized to range from 0 to 100, with higher scores indicating better health. The SF-12 has

demonstrated good reliability and validity in this population,[38] including the present sample (α =0.85).

Relationship Quality

Patients and caregivers were each asked to rate their relationship using single items. Patients rated the overall quality of the relationship on a 0 (worst) to 5 (best) scale using an item created for the purpose of the parent study; caregivers rated overall quality of the relationship on a 1 (never good) to 4 (always good) scale using an item from the Carers of Older People in Europe (COPE) Index.[39]

Care Strain

Caregiver strain was measured using the 24-item Caregiver Burden Inventory.[40] The multidimensional measure evaluates the impact of providing care on various aspects of the caregiver's life using a 5-point scale from 0 (not at all disruptive) to 4 (very disruptive). Higher scores indicate greater strain from providing care. The total score was used in the present study. Cronbach's alpha in the present study was 0.97.

Perceived Social Support

Caregiver perceived social support was measured using the four-item subscale from the COPE Index.[39] Caregivers were asked to rate the quality of social support they received on a 1 (never) to 4 (always) scale. Higher scores indicate greater perceived support. The COPE Index has been validated in several European languages, including Italian, and has demonstrated good reliability and validity.[39,41]

Socio-demographic and Clinical Characteristics

Patient and caregiver demographics were obtained via a self-reported survey (e.g., age, gender, education, marital status, employment). Additionally, patient clinical information was

obtained from medical records (e.g., duration of HF, hospitalization for HF within the last year, and New York Heart Association (NYHA) functional class).

Data analyses

Hierarchical linear modeling (HLM) 7 (Skokie, IL) was used to analyze data at the level of the dyad to control for interdependencies in the data.[42,43] The multivariate outcomes model estimates a latent score for each member of the dyad (i.e., one for the patient and one for the caregiver), controlling for the dependent nature of dyadic data. Such approaches are far superior to traditional methods and allow for direct examination of both actor (own) and cross-partner (other member of the dyad) effects.[43,44] The Level 1 (within-dyad) model represents the confidence scores (Y) for both patient and caregiver as the sum of a latent true score (β_1 for the patient and β_2 for the caregiver) plus a residual term r that captures measurement error and was specified as:

$$Y_{ij} = \beta_{1j} (\text{PATIENT}_{ij}) + \beta_{2j} (\text{CAREGIVER}_{ij}) + r_{ij}$$

where Y_{ij} represents the confidence score i in dyad j ($i = 1,….$k responses per dyad). PATIENT is an indicator variable taking on a value of 1 if the response was obtained from a patient and 0 if the response was obtained from a caregiver. CAREGIVER is an indicator variable taking on a value of 1 if the response was obtained from a caregiver and 0 if the response was obtained from a patient. Thus, β_{1j} and β_{2j} represent the patient's and caregiver's latent confidence scores respectively. These estimates are known as fixed effects in the model. The r_{ij} are the within-dyad residuals, also known as the Level 1 random effects. The variance components associated with these random effects can be tested using a chi-square-test to determine whether there is significant variability around average levels of patient and caregiver confidence. If there is, significant heterogeneity in confidence exists across dyads and independent variables can be

included to explain this heterogeneity.

The Level 2 (between-dyad) model consists of simultaneous regression equations with β_{1j} and β_{2j} now serving as dependent variables and can be specified as:

$$\beta_{1j} = \gamma_{10} + [\gamma_{11}\, \text{Predictor}_1 + \gamma_{1n}\, \text{Predictor}_{n]} + u_{1j} \tag{2}$$

$$\beta_{2j} = \gamma_{20} + [\gamma_{21}\, \text{Predictor}_1 + \gamma_{2n}\, \text{Predictor}_{n]} + u_{2j}$$

γ_{10} and γ_{20} are the Level 2 intercepts, representing average values of confidence for patient and caregiver, respectively, adjusted for the effects of the predictors in each equation. The fixed effects of each predictor are captured by the respective regression coefficient γ and represent the association of each predictor with the confidence of either patients or caregivers. Taken together, these equations can account for patient and caregiver levels of confidence as a function of both individual and dyad-level factors.

A Level 2 (between-dyad) model including both actor (e.g., patient age predicting patient confidence; caregiver strain predicting caregiver confidence) and partner effects (e.g., patient's cognitive impairment predicting caregiver's confidence; caregiver health predicting patient confidence) was examined. Independent variables were mean centered for ease of interpretation, except where a raw value of zero was considered meaningful (e.g., number of hospitalizations). Coefficients for each independent variable are interpreted as unstandardized B coefficients in a simultaneous multiple regression. A parallel scales approach was used to maximize reliability of the data in estimating Level 1 models.[45] Given the small number of items on the confidence subscale, each item served as a parallel scale, an approach considered more reliable than the alternative known variance method.[42]

Results

Sample Characteristics

The sample characteristics (n=329 HF dyads) are shown in **Table 1**. The average age of patients and their caregivers was 76.8 (*SD*=9.7) and 58.3 (*SD*=14.3) years respectively. Patients were predominantly married (62%), cared for by an adult-child (60%), and just over half the patient sample was male (56%). Patients had been living with HF, on average, for almost six years; more than half of patients had a NYHA class I/II HF. Slightly more than half of caregivers were women (54%) and just over half reported being currently employed. On average, patients and caregivers rated their relationship with each other as good.

Dyadic HF Confidence

Results of the Level 1 (within-dyad) model showed that patients and caregivers reported moderate levels of HF self-care confidence, with caregivers reporting more confidence than patients (**Table 2**). More importantly, there was significant variability around the average scores for both patients and caregivers indicating significant heterogeneity in confidence across dyads.

Patient- and caregiver-level factors that accounted for significant variability in HF self-care confidence across HF dyads are presented in **Table 3**. Patient and caregiver levels of confidence were significantly higher when the patient rated the quality of the relationship higher, the caregiver experienced greater mental health, and the patient had lower levels of cognitive impairment. Certain factors only influenced the HF self-care confidence of patients; patient female gender, non-spousal care dyads, poor caregiver physical health, and low care strain were significantly associated with higher levels of confidence in patients. Other factors only influenced the self-care confidence of the HF caregiver; low patient education, worse HF-specific emotional quality of life, high caregiver education, and greater perceived social support by the caregiver were significantly associated with higher levels of confidence in caregivers.

Discussion

Little is known about how HF patients and caregivers work together and even less is known about the factors that influence their levels of confidence in contributing to HF self-care. The current study is the first study to examine determinants of confidence in HF dyads using multilevel modeling and several of our findings are noteworthy. First, most dyads reported moderate levels of confidence that fall short of recommended guidelines for adequate self-care. Second, caregivers reported higher levels of self-care confidence than HF patients. Third, there was considerable variability across dyads in levels of HF self-care confidence reported by patients and caregivers. Finally, patient- , caregiver- and dyadic-level factors all played important roles in explaining variability in self-care confidence of both HF patients and their caregivers.

Self-Care Confidence of Patients and Caregivers

Our finding that the patient's perception of the quality of the relationship with the caregiver was significantly associated with both the patient's and caregiver's level of confidence is consistent with both conceptualizations of confidence[46] and previous research in HF.[8,12,17] Indeed, Bandura believed the illness process to be a social, not individual one, with positive interactions with family members heightening confidence in managing chronic illness.[47] Additionally, the protective nature of relationship quality for HF caregivers has previously been demonstrated.[6,12,48] Positive care relationships tend to encompass open communication and shared appraisals of symptoms, allowing for greater collaboration and shared decision-making vital to achieving positive outcomes for both members of the dyad.[20,49] Given the preponderance of protective buffering (i.e., symptom concealment, communication avoidance) that accompanies chronic illness,[49] interventions that directly facilitate communication and disclosure within care

dyads and provide strategies to foster collaboration (e.g., we-talk) are needed. The fact that the caregiver's perception of the quality of the relationship was not a significant determinant may be partly due to the difference in items used for each member of the dyad, though the importance of the patient's perception of the relationship has also been found in chronic pain dyads.[50]

Both patients and caregivers reported lower self-care confidence when the caregiver experienced poor mental health. The negative consequences of providing care to a family member have been well-documented[4,23,28,51] and are likely due to the heavy symptom burden of HF and the emotional toll of caring for a family member with a terminal illness. Poor mental health impacts caregiver appraisals[50,52] and may diminish the caregiver's capacity to be supportive. Evidence also suggests caregiving interventions may be less effective in caregivers with high levels of depressive symptoms,[53,54] indicating caregiver mental health must be prioritized before expecting new skills. Not surprisingly, both patients and caregivers reported less confidence when the patient experienced cognitive impairment, reflecting the complexity of self-care in the context of HF.[2]

Self-Care Confidence of Patients

In contrast to previous research, we observed that men with HF reported lower levels of confidence than women.[13] Further work is needed to understand if this is particular to the Italian sample or would be replicated in studies with more gender-balanced samples as was the case in the current study. Our results also indicate that patients may be particularly at risk for low levels of self-care confidence when cared for by a spouse. Spouse caregivers in the current sample had significantly poorer physical health than adult-child caregivers. Thus, spousal caregivers may be managing their own illness, and also may be less capable of engaging in HF self-care or feeling confident to do so. HF patients in these couples may need to be primarily responsible for the

maintenance and management of their own illness and, subsequently acquire greater expertise and confidence. This may also explain the association between high patient confidence and worse caregiver physical health. An interesting observation from these data show that while over 60% of patients are married only 40% are cared for by a spouse, suggesting that some adult-children may be caring for two ill parents. Thus, it is highly likely that this sample contained a sub-sample of chronically-ill couples where both spouses were in need of care. Alternatively, patients who have access to a caregiver with good physical health (more likely an adult-child of the patient) may have less need to be engaged and confident in their own self-care.

Another important risk factor for patients is the level of strain felt by their caregiver. Such adverse consequences of providing care are known to lead to poor physical and mental health,[4,55,56] and in the case of spouse caregivers, increased mortality.[57] Thus, interventions that include components that address caregiver strain may be more effective in ameliorating both caregiver and patient outcomes and maximize the potential for caregivers to provide greater support. Finally, in contrast to prior research on HF self-care[6,11,23-26] we did not find patient education or quality of life to be significant determinants of patients' self-care confidence. It may be that level of education and quality of life play less of a role in self-care confidence when more comprehensive multivariate models of patient and caregiver characteristics are examined.

Self-Care Confidence of Caregivers

Although patient level of education and health did not significantly predict patient confidence, as in previous research, caregiver confidence was lower when patients reported good mental health and higher levels of education. Such patients may be more independent and engaged in their self-care resulting in caregivers perceiving low need to become as engaged. Enactive engagement or "the doing" of a task has often been considered one of the strongest

ways to increase levels of confidence,[46] thus caregivers with inadequate exposure or perceived opportunity to engage in HF self-care may be more likely to lack confidence to do so. Similar to the protective role of relationship quality (discussed above) caregivers, who reported high levels of social support, experienced significantly higher confidence. This finding, once again, emphasizes the importance of acknowledging the relational and familial aspects of HF self-care for both patient and caregiver. Finally, as expected, caregivers with higher levels of education reported significantly more confidence.

Strengths and Limitations

The current study has several limitations. First, the cross-sectional design of the study limits discussion of directional effects. Clearly, the cross-sectional data implies that low confidence may lead to poor mental health, for example, as has been suggested by others. In reality the relationship between these variables is most likely recursive, but without studies that explicitly examine dyads over time we are not able to uncover directionality and more complex relationships. Second, it is unclear how much the current results will generalize beyond the Italian population. For example, caregiver gender was more balanced in the present study than the majority of studies reporting high percentages of female caregivers. When adult-children become involved, older adults in Italy prefer to be cared for by someone of the same gender. Additionally, the current study focused on spouse and adult-child caregivers. Thus, these findings will need to be replicated in other cohorts of HF patients and their informal caregivers. Third, the patient sample was relatively healthy and there was large variability in levels of care strain experienced. It is unclear if findings would be replicated in samples of predominantly advanced HF. Finally, our comprehensive models accounted for a moderate amount of variance in patient and caregiver self-care confidence, but there is clearly much more to be explained.

Future research should include multi-item specific measures that capture varying aspects of collaboration and relationship quality (e.g., communication, decision-making, reciprocity, dyadic coping) that will be informative in leading to tailored interventions.

Implications for Practice and Research

Despite these limitations, the current study has several important strengths and implications for practice and research. First, this is one of the only known studies to examine modifiable determinants of confidence in contributing to self-care in HF dyads. By including both patient and caregiver using appropriate dyadic methodologies, we gain a more realistic estimate of the determinants of confidence to self-care for patients and their primary caregivers and potential avenues for intervention. Additionally, the inclusion of both patient and caregiver predictor variables allowed us to examine both actor and partner effects to further understanding of the relational aspect of HF self-care. We found four partner effects for the patient and three partner effects for the caregiver, greatly reinforcing the need to take a dyadic approach to the study of HF. Second, the current study involved a more comprehensive predictive model than previously examined with traditional demographic and individual health variables and also the inclusion of variables beyond the individual (i.e., relationship quality, social support). The importance of these relational and social factors, controlling for individual variables, in culmination with the partner effects, underlines the need for health care providers to focus strategies and interventions at the level of the HF dyad, not the patient.

Taking a dyadic perspective to HF practice will allow clinicians to be vigilant for patients who may not be in a supportive care relationship, while also identifying caregivers who may be experiencing high levels of depressive symptoms and strain and low levels of social support. Such modifiable risk factors are often closely intertwined. By facilitating conversations with the

patient and caregiver regarding their respective fears, concerns, and competing needs, clinicians can optimize the collaborative nature of the dyad, leading to increased confidence to self-care. Similarly, providing the dyad with problem-solving skills and fostering a team-based approach can assist the dyad in seeking out additional resources and social support needed to maintain the health and well-being of both patient and caregiver, and in some cases the viability of the care dyad. In particular, clinicians need to be mindful of the emotional toll of the illness on both patient and caregiver with regular assessment of the caregiver recommended. Addressing the mental health needs of both members may lead to far more efficacious outcomes than traditional individual-level approaches. Cardiovascular nurses are ideally positioned to take a more dyadic perspective, identify at-risk care dyads and provide needed resources and strategies. Additionally, the cardiovascular nurse can work with families early in the HF trajectory (even before a caregiver perceives a need to actively engage) to help build caregiver confidence and more collaborative strategies so that both members of the dyad are better prepared when need increases.

Conclusion

Consistent with other research, levels of confidence to contribute to HF self-care fell far short of acceptable levels in the current study. Better caregiver mental health and greater relationship quality were the modifiable hallmarks of better self-care confidence in both the patient and caregiver. More work is clearly needed, beyond traditional individual-level educational interventions, to increase confidence within HF dyads, given the importance of this concept to optimal patient outcomes and the clear social/relational aspect of HF. Targeting interventions and practice at the level of the HF dyad will lead to greater optimal outcomes for both patient and caregiver.

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Table 1: Sample Characteristics (N=329 HF Dyads)

	Patients	Caregivers
	mean ± standard deviation, or n (%)	
Age (in years)	76.8±9.7	58.3±14.3
Gender (% female)	144 (44%)	179 (54%)
Married	204 (62%)	258 (78%)
Currently employed (%)	29 (9%)	167 (51%)
Education (% high school or beyond)	86 (26%)	184 (56%)
Caregiver type (% spouse)	-	133 (40%)
NYHA class		
I/II	187 (57%)	-
III/IV	140 (43%)	-
Months with HF	58.7±47.6	-
Hospitalized for HF in last year	176 (54%)	-
Cognitive impairment (MMSE score)	23.9±6.3	-
HF-specific physical quality of life†	22.0±8.4	-
HF-specific emotional quality of life†	11.3±5.5	-
General physical health‡	-	45.5±8.8
General mental health‡	-	47.5±9.8
Care strain	-	29.9±23.9
Perceived social support	-	10.6±2.4
Perceived relationship quality	4.2±1.1	3.2±0.9

† = Minnesota Living with Heart Failure Questionnaire

‡ = SF-12 health survey

HF = heart failure, MMSE = Mini Mental State Examination

Table 2: Multilevel Model Level 1 Results of Patient & Caregiver Confidence (N=329 Dyads)

	Unstandardized β	p	
Fixed effects			
Patient confidence	50.81	<0.001	
Caregiver confidence	53.79	<0.001	
Random effects	Variance Components	χ^2	p
Patient confidence	193.40	744.06	<0.001
Caregiver confidence	196.46	759.24	<0.001

Table 3: Multilevel Model Level 2 Results Predicting Patient & Caregiver Confidence (N=329 Dyads)

	Patients		Caregivers	
	Unstandardized β	p	Unstandardized β	p
Intercept	54.73	<0.001	53.29	<0.001
Patient Variables				
Age	-0.20	0.097	-0.14	0.236
Gender (Male)	-5.15	0.010	0.80	0.696
Education (High school or beyond)	-2.79	0.314	-7.25	0.007
Cognitive impairment (MMSE score)	0.62	<0.001	0.52	0.008
HF-specific physical quality of life†	-0.06	0.639	0.08	0.552
HF-specific emotional quality of life†	0.36	0.113	0.46	0.046
Hospitalized for HF in last year	-0.88	0.452	0.43	0.721
Perceived relationship quality	2.58	0.017	2.96	<0.001
Caregiver Variables				
Gender (Female)	1.09	0.562	-0.15	0.940
Caregiver type (Spouse)	-4.24	0.047	-3.02	0.181
Education (High school or beyond)	2.66	0.247	5.27	0.029
General physical health‡	-0.43	0.002	-0.07	0.605
General mental health‡	0.28	0.022	0.43	<0.001
Care strain	-0.11	0.041	0.04	0.453
Relationship quality	1.35	0.255	0.92	0.468
Perceived social support	0.67	0.139	1.24	0.008

Note: coefficients are adjusted for the influence of all multivariate model factors.

† = Minnesota Living with Heart Failure Questionnaire

‡ = SF-12 health survey

HF = heart failure, MMSE = Mini Mental State Examination