

# Family partner intervention influences self-care confidence and treatment self-regulation in patients with heart failure

European Journal of Cardiovascular Nursing  
2016, Vol. 15(5) 317–327  
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DOI: 10.1177/1474515115572047  
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## Abstract

**Background:** Heart failure self-care requires confidence in one's ability and motivation to perform a recommended behavior. Most self-care occurs within a family context, yet little is known about the influence of family on heart failure self-care or motivating factors.

**Aims:** To examine the association of family functioning and the self-care antecedents of confidence and motivation among heart failure participants and determine if a family partnership intervention would promote higher levels of perceived confidence and treatment self-regulation (motivation) at four and eight months compared to patient–family education or usual care groups.

**Methods:** Heart failure patients ( $N=117$ ) and a family member were randomized to a family partnership intervention, patient–family education or usual care groups. Measures of patient's perceived family functioning, confidence, motivation for medications and following a low-sodium diet were analyzed. Data were collected at baseline, four and eight months.

**Results:** Family functioning was related to self-care confidence for diet ( $p=0.02$ ) and autonomous motivation for adhering to their medications ( $p=0.05$ ) and diet ( $p=0.2$ ). The family partnership intervention group significantly improved confidence ( $p=0.05$ ) and motivation (medications ( $p=0.004$ ); diet  $p=0.012$ ) at four months, whereas patient–family education group and usual care did not change.

**Conclusion:** Perceived confidence and motivation for self-care was enhanced by family partnership intervention, regardless of family functioning. Poor family functioning at baseline contributed to lower confidence. Family functioning should be assessed to guide tailored family–patient interventions for better outcomes.

## Keywords

Heart failure, family interventions, self-care confidence, medication administration, low-sodium diet

Date received 12 May 2014; revised 13 January 2015; accepted 19 January 2015

## Introduction

Approximately 40% of deaths in the United States (US) are associated with social and behavioral factors that lead to the rapid progression of chronic conditions such as heart failure (HF).<sup>1</sup> HF is a major public health problem as it affects 5.8 million in the US and more than 23 million individuals worldwide.<sup>2</sup> Family members (FM) are involved in, and influence the self-care of, their loved ones with HF.<sup>3–6</sup> Prior research has associated FM problem-solving abilities, FM communication skills and FM accompaniment to provider visits with better levels of self-care confidence and self-care in individuals with HF.<sup>7,8</sup> Additionally, family functioning is associated with quality of life in HF patients,<sup>9,10</sup> and family focused interventions have improved dietary adherence.<sup>11</sup>

The way a family communicates as well as adapts to and solves problems may affect a HF patient's adherence to their self-care.<sup>8,9</sup> Self-determination theory (SDT) is a

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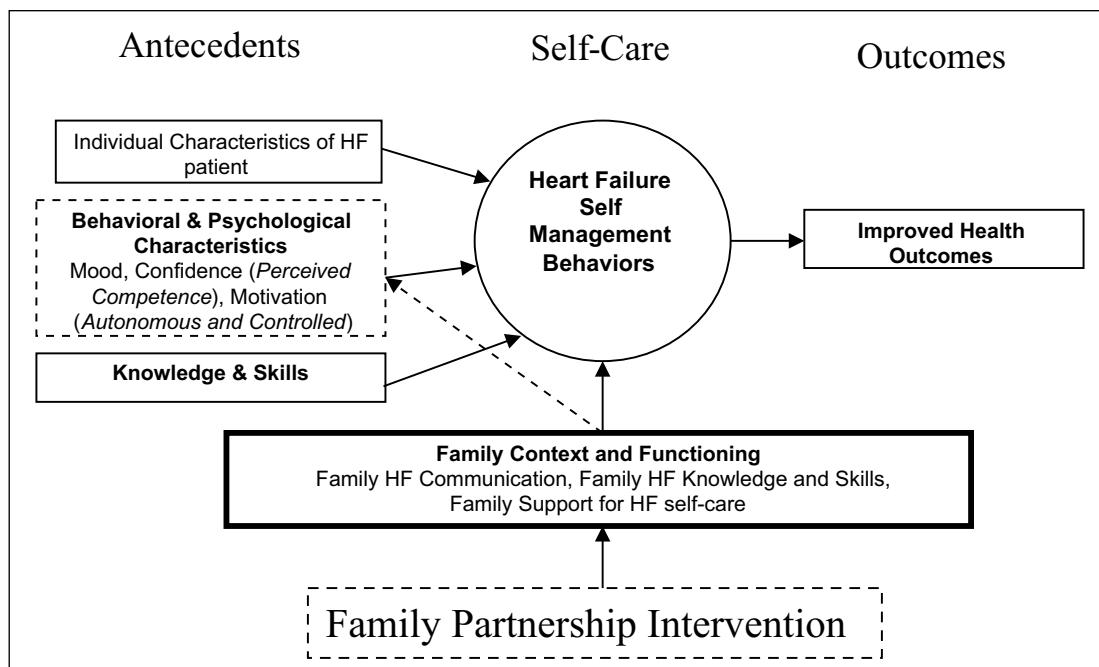
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**Figure 1.** Model of family context and heart failure self-care.

theory of motivation to perform a behavior and proposes that autonomy and motivation are essential factors for achieving behavioral change.<sup>12</sup> Two types of motivation described by SDT are controlled and autonomous regulation. Controlled regulation occurs when an individual performs a behavior because they feel externally pressured, which could be verbal (e.g. 'you should') or psychological (e.g. feelings of guilt).<sup>13</sup> Conversely, autonomous regulation occurs when an individual performs a behavior because they value the behavior and have the ability to integrate it into their life.<sup>13,14</sup> Autonomous behavior is linked to greater adherence, whereas controlled regulation is associated with non-adherent behaviors.<sup>13</sup> Individuals are more likely to be motivated to perform healthy behaviors, or change unhealthy behaviors, when they feel a sense of autonomy, competence and support by FMs.<sup>12,14,15</sup> FMs can provide support through encouragement, empathy and a clear sense of choice regarding activities surrounding self-care for the HF patient.<sup>14,16,17</sup>

Another component of adherence is the patient's self-efficacy or confidence in performing HF self-care.<sup>18</sup> Self-efficacy is a major construct of Social Cognitive Theory (SCT) and is defined as confidence in one's ability to perform a behavior to accomplish a specific outcome. The family model posits that antecedents of self-efficacy, knowledge, skills and motivation as well as positive family context, promotes and reinforces self-care behaviors.<sup>14</sup> Although the SDT and SCT models differ somewhat in conceptual terms and areas of emphasis,<sup>19</sup> they share a common focus on motivation to engage in healthy behaviors, with both emphasizing perceptions of competence or

efficacy. Better family functioning can lead to greater levels of motivation and confidence by the patient with HF.<sup>14,20</sup> Thus, this study examined both facets (motivation and confidence) from the HF patient's perspective to predict medication and diet adherence in response to family focused interventions (see Figure 1). A prior report described the benefit of a family partnership intervention (FPI) with regard to improvements in low-sodium diet adherence.<sup>11</sup> In this study we examined: (1) the association of family functioning and the self-care antecedents of perceived confidence and treatment self-regulation (autonomous and controlled) and (2) whether participants exposed to a FPI had greater confidence scores for diet, medications and treatment self-regulation at baseline, four and eight months compared to participants exposed to patient–family education (PFE) intervention or usual care (UC).

## Methods

### Design

Study methods, sample, interventions and consort flow chart have been described elsewhere;<sup>11</sup> however, a brief description of these sections is provided below. A three-group randomized design was used with data collection at baseline, four and eight months. Participants with HF and one of their FMs were randomized as dyads. The randomization occurred via a computer program in which sequential participant identification numbers were randomly assigned to groups. The group assignments were then placed in envelopes and opened after the participants were

enrolled. Data from only the HF participant is reported. The three groups were (1) UC, (2) PFE and (3) FPI. Baseline to four months was the intervention phase and four to eight months was considered the maintenance phase of behavior change.<sup>21,22</sup> The Emory University Institutional Review Board and all participating sites approved all study protocols including the informed consent.

### **Setting and participants**

Patients with HF and their FMs ( $N=117$  dyads) were recruited from three large medical centers in the southeastern US that had outpatient HF clinics. Inclusion criteria for patients with HF were: (1) diagnosis of HF confirmed in the medical record, NYHA class II–III, (2) age 30–79 years (to capture systolic HF patients earlier in their trajectory of disease), (3) ability to read, write and speak English, (4) telephone access, (5) on medications that included ACE-inhibitors or angiotension II receptor blockade, beta-blocker and diuretics unless contraindicated, (6) ambulatory, (7) glomerular filtration rate  $> 30$  ml/min and (8) availability of a participating FM who assisted with the HF self-care.

Exclusion criteria for patients with HF: (1) myocardial infarction within last 6 months, (2) unstable angina, (3) renal failure, (4) impaired cognition, (5) psychiatric diagnosis of schizophrenia, dementia or any other mental health condition that would impair their ability to participate, (6) HF secondary to a treatable medical condition, (7) planned cardiac surgery or (8) uncorrected visual or hearing problems.

### **Interventions**

**Usual care.** UC received educational pamphlets that were derived from the HF Society of America regarding HF self-care in addition to UC from their healthcare providers.

**Patient family education.** Dyads received a one-hour education session that was delivered by a research nurse. Written and DVD educational content included general information about HF symptoms and self-care. The dyads attended a second, two-hour, group session led by a research nurse and registered dietitian to reinforce diet and medication adherence education. HF participants received feedback regarding their sodium intake and medication adherence. After the four months, the participants received a telephone education booster session. Newsletters were mailed to participants detailing strategies to low-sodium diet and medication adherence.

**Family partnership intervention.** Dyads received the same education and counseling as described above in the PFE group plus two additional two-hour sessions that focused on teaching the dyads how to give support for each other's specific roles. The FM was counseled on ways that they could use autonomy support techniques to decrease negative criticism

of the HF patient, increase family problem-solving, lend more control to patients concerning their self-care, and promote patient confidence.<sup>1,16,23</sup> In addition to written materials and DVD provided to the PFE group, dyads received written information about family partnership and autonomy supportive communication.

### **Procedure and data collection**

Baseline demographic and clinical characteristics for participants with HF were collected by self-report questionnaires and information derived from their medical record. The Charlson comorbidity score was calculated as a measure of the presence of other comorbidities.<sup>24</sup>

**Motivation for health behaviors.** Motivation for medication and low-sodium diet adherence was measured with the Treatment Self-Regulation Questionnaire (TSRQ).<sup>13,25</sup> The TSRQ assesses a patient's motivation for following health behaviors and their recommended treatment regimen across settings with 15-items representing taking responsibility; motivation for performing the behavior (guilt or shame); and belief in following the behaviors of diet and medication adherence. The TSRQ is designed to be adapted for the particular health behavior that is being investigated. For example, 'the reason I will use HF medications as suggested to manage my HF is because I feel that I want to take responsibility for my own health'. Items were rated on a seven point Likert-type scale ranging from 1 (not at all true) to 7 (very true). Total scores were calculated which ranged from one to seven with higher scores indicating greater levels of autonomous regulation or higher levels of controlled regulation. Cronbach's alpha reliabilities in this study were: TSRQ-AUTO-MED (autonomous) 0.67, TSRQ-CON-MED (controlled) 0.79, TSRQ-AUTO-DIET (autonomous) 0.78 and TSRQ-CON-DIET (controlled) 0.84.

**Perceived confidence.** Perceived confidence for diet and medication adherence was measured with the Perceived Confidence Scale (PCS).<sup>26</sup> This is a four-item scale that was originally used to assess how competent people perceived their ability to perform a behavior.<sup>26,27</sup> We adapted the PCS for HF medication and dietary behaviors as recommended by creators of the original instrument. Each scale included four items that reflected the participants' experiences of feeling able to manage their HF successfully. For example, 'I feel confident in my ability to improve my sodium by changing my diet'. Responses were made on a seven-point Likert-type scale, ranging from one to seven. Higher total scores indicate more self-confidence for low-sodium diet and medication adherence. The Cronbach alpha reliabilities in this study were: PCS-MEDS 0.93 and PCS-DIET 0.95.

**Family assessment device.** The Family Assessment Device Questionnaire (FAD) is a 53-item scale based on the

McMaster Model of Family Functioning, which conceptualizes the organization of families and their interactions.<sup>28</sup> This tool has been validated to distinguish between healthy and unhealthy family interactions. The FAD<sup>29</sup> has several scales measuring aspects of family function, and in this study we focused on the 12-item global family function (GFF) scale which assesses the participant's perceptions of the overall health of the family.<sup>28</sup> Final mean score for GFF ranges from one to four (healthy to unhealthy family functioning). Cronbach alpha for the GFF in this study was 0.90. Standard cut score (2.0) was used to determine the percentage in the highest and lowest category for GFF<sup>28,30</sup> where scores ( $>2$ ) indicate poor GFF and lower scores ( $\leq 2$ ) indicate better GFF. In this study, the FAD was only measured at baseline.

## Data analysis

Descriptive statistics were used to describe the sample and evaluate underlying distribution assumptions. T-tests, analysis of variance (ANOVA), and chi-square tests were used to compare the demographics, clinical characteristics and outcome measures at baseline between the groups and by levels of family functioning. Intent-to-treat procedures were followed for hypothesis testing. Missing data were reviewed for missing at random (MAR) assumptions.<sup>31</sup> Multilevel mixed (MLM) longitudinal models were used for testing group, time and group-by-time effects for the outcome measures. For the outcomes of controlled TSRQ-CON-MEDS/DIET, which were continuous variables and normally distributed, linear MLM models were performed. However, the outcomes of PCS-MEDS/DIET and autonomous TSRQ-AUTO-MEDS/DIET were significantly skewed to the left with nearly half of the participants scoring the maximum of seven. Each of these outcomes was dichotomized into less than seven (LOW confidence or autonomous self-regulation) and equal to seven (HIGH confidence or autonomous self-regulation). For these dichotomized outcomes, generalized MLM were run for a binomial response function with a logit link (e.g. longitudinal logistic regression) (SPSS v.21 GENLINMIXED procedure) to test for group, time and group-by-time effects. For all models, planned post hoc contrasts for time were run for group-by-time effects (specified contrasts of PFE and FPI to UC (at each time point) and for four and eight months compared to baseline) adjusting for baseline family functioning (as a covariate) due to the significant relationship obtained in the above analysis. All effect sizes (ES) for significant post hoc comparisons were calculated as a function of the test statistic for the corresponding effect's test (ES = Cohen's  $d=2*t/\text{square root (degrees of freedom)}$ ).<sup>32</sup>

## Results

The randomization procedures resulted in no differences among groups in baseline demographic or clinical

characteristics (Table 1); the consort flow chart with the details of dyads screened, excluded, enrolled is described elsewhere.<sup>11</sup> Participants  $N=117$  dyads completed the baseline data collection (Table 1). Of the 117 enrolled at baseline, 32 (27.4%) left the study (six deaths, eight withdrawn, and 18 lost to follow-up). These attrition rates were not different between the groups at four ( $\chi^2_{(2)}=0.845$ ,  $p=0.655$ ) and eight months ( $\chi^2_{(2)}=0.394$ ,  $p=0.821$ ). No covariates were associated with missing data amounts (statistical models met the MAR assumptions).<sup>31</sup>

### *Association of family functioning, perceived confidence for medications, diet and treatment self-regulation*

Based on the standard cut scores, around 40% of the sample had family functioning scores considered low, however there were no differences by randomized groups (Table 1). To assess family functioning at baseline as a potential covariate, perceived confidence for medication, diet and motivation (autonomous and controlled) were compared by family functioning level (Table 2). Slightly more than three-quarters (76.1%) of the participants had a high level of perceived confidence for medication adherence with no difference between levels of baseline family functioning (Table 2) and no difference among the three groups (Table 3).

Less than half (46.9% of the participants) had high levels of perceived confidence for diet (Table 2), with some variation across the three groups at baseline (Table 3). However, significantly more participants with better family functioning had high perceived confidence for diet ( $p=0.02$ , Table 2). For the longitudinal perceived confidence for diet model, family functioning was not significant covariate ( $p=0.18$ ) and none of the group, time, group-by-time interaction effects were significant.

Approximately half (51.3%) of the participants had high autonomous motivation for medications at baseline (Table 2). Participants with better family functioning had a greater percentage who also had both high autonomous motivation for medications ( $p=0.05$ ) and diet ( $p=0.02$ ) (Table 2). Although the controlled motivation for medications and diet scores were slightly higher for participants with poor baseline family functioning, the differences between poor and good family functioning were not significant (Table 2).

### *Effects of the FPI on perceived confidence for medications, diet and treatment self-regulation*

The percentage of FPI participants with high perceived confidence for medication adherence increased significantly from 72% at baseline to 90.6% at four months ( $p=0.05$ , small ES=0.24) (Figure 2). There were no group or time effects for perceived confidence in diet.

**Table 1.** Demographics and clinical baseline measures.

Variable mean (SD) or %	Total N=117	Usual care n=8	PFE n=2	FPI n=37	p-values ANOVA <sup>a</sup> or $\chi^2$ tests <sup>b</sup>
Age range years	28–78 55.9 ± 10.5	31–74 55.8 ± 10.3	28–78 56.7 ± 11.1	38–78 55.1 ± 10.2	$p=0.79^a$
Gender M/W%	63%/37%	68%/32%	55%/45%	68%/32%	$p=0.36^b$
Education					
% ≥ college	47.9%	55.3%	52.4%	35.1%	$p=0.17^b$
Race					
% caucasian	42%	37%	43%	46%	$p=0.72^b$
% AA	58%	63%	57%	54%	
Family member					
% spouse/partner	52.6%	56.8%	40.5%	62.2%	$p=0.14^b$
% adult child/sibling <sup>c</sup>	22.4%	24.3%	23.8%	18.9%	
% other <sup>c</sup>	25.0%	18.9%	35.7%	18.9%	
NYHA class					
% level II	72.6%	76.3%	69.0%	73.0%	$p=0.77^b$
% level III	27.4%	23.7%	31.0%	27.0%	
LVEF	26.9 ± 13.7 N=91	24.4 ± 11.2 n=30	25.8 ± 12.8 n=32	30.7 ± 16.5 n=29	$p=0.18^a$
Charlson comorbidity	3.1 ± 2.2 [1–14]	2.9 ± 1.8 [1–8]	3.0 ± 2.1 [1–10]	3.2 ± 2.7 [1–14]	$p=0.73^b$
% > I	76.9%	73.7%	81.0%	75.7%	
BMI	33.7 ± 8.4	33.1 ± 7.9	33.7 ± 8.5	34.4 ± 9.0	$p=0.80^a$
BDI total	13.1 ± 10.0	13.5 ± 11.0	12.6 ± 10.2	13.4 ± 8.8	$p=0.95^b$
% ≥ 19	24.6%	26.3%	23.1%	24.3%	
FAD-GFF	1.96 ± 0.6	2.01 ± 0.5	1.91 0.6	1.97 0.6	$p=0.19^b$
% > 2	40.4%	39.5%	30.8%	51.4%	

<sup>a</sup>p-value for ANOVA reported.<sup>b</sup>p-value for chi-square test reported.<sup>c</sup>These categories were combined for the purpose of comparing the groups via chi-square analysis.**Table 2.** PCS and TSRQ scores by general family functioning (at baseline).

Measure	Overall n=113		GFF <=2 (better GFF) n=68		GFF > 2 (poor GFF) n=45		Test for differences $\chi^2(df=1), p=$
	n/TL	%	n/TL	%	n/TL	%	
PCS-MEDS [%=7] <sup>a</sup>	86	76.1%	53	77.9%	33	73.3%	0.316, $p=0.57$
PCS-DIET [%=7] <sup>a</sup>	53	46.9%	38	55.9%	15	33.3%	5.529, $p=0.02$
TSRQ-AUTO-MEDS [%=7] <sup>a</sup>	58	51.3%	40	58.8%	18	40.0%	3.841, $p=0.05$
TSRQ-AUTO-DIET [%=7] <sup>a</sup>	58	51.3%	41	60.3%	17	37.8%	5.495, $p=0.02$
	Mean (SD)		Mean (SD)		Mean (SD)		t(df), $p=$
TSRQ-CON-MEDS	3.73 (1.6)		3.56 (1.5)		3.98 (1.6)		1.417 (111), $p=0.16$
TSRQ-CON-DIET	3.56 (1.7)		3.34 (1.6)		3.88 (1.7)		1.681 (111), $p=0.10$

GFF: Global Family Functioning

PCS-MEDS: perceived competence taking medicines

PCS-DIET: perceived competence for diet

TSRQ-AUTO-MEDS: treatment self-regulation taking medicines – autonomous

TSRQ-AUTO-DIET: treatment self-regulation for diet – autonomous

TSRQ-CON-MEDS: treatment self-regulation taking medicines – controlled

TSRQ-CON-DIET: treatment self-regulation for diet – controlled

<sup>a</sup>PCS-MEDS, PCS-DIET, TSRQ-AUTO-MEDS and TSRQ-AUTO-DIET were dichotomized since the underlying distributions were highly skewed with the majority of the scores either <7 (LOW confidence or self-regulation) or =7 (HIGH confidence or self-regulation).

**Table 3.** Perceived confidence and treatment self regulation (autonomous and controlled) for medications and diet by group descriptives.

Measure (dichotomized proportions)	Baseline		4 mo. <sup>c</sup>		8 mo.	
	count/n	(%)	count/n	(%)	count/n	(%)
<b>PCS-MEDS [% HIGH]<sup>a</sup></b>						
Usual care	28/38	(73.7%)	25/31	(80.6%)	20/29	(69.0%)
PFE	32/39	(82.1%)	24/31	(77.4%)	23/30	(76.7%)
FPI	26/36	(72.2%)	29/32	(90.6%)	20/26	(76.9%)
<b>PCS-DIET [% HIGH]<sup>a</sup></b>						
Usual care	13/38	(34.2%)	17/31	(54.8%)	14/29	(48.3%)
PFE	21/39	(53.8%)	17/31	(54.8%)	16/30	(53.3%)
FPI	19/36	(52.8%)	19/32	(59.4%)	11/26	(42.3%)
<b>TSRQ-AUTO-MEDS [% HIGH]<sup>b</sup></b>						
Usual care	19/38	50.0%			19/29	65.5%
PFE	21/39	53.8%			23/30	76.7%
FPI	18/36	50.0%			21/25	84.0%
<b>TSRQ-AUTO-DIET [% HIGH]<sup>b</sup></b>						
Usual care	20/38	52.6%			21/29	72.4%
PFE	25/39	64.1%			21/30	70.0%
FPI	13/36	36.1%			17/25	68.0%
<b>(continuous scores)</b>						
	<i>n</i>	Mean (SD)			<i>n</i>	Mean (SD)
<b>TSRQ-CON-MEDS</b>						
Usual care	38	3.98 (1.33)			29	4.46 (1.35)
PFE	39	3.69 (1.58)			30	4.04 (1.48)
FPI	36	3.50 (1.80)			25	3.61 (1.65)
<b>TSRQ-CON-DIET</b>						
Usual care	38	3.72 (1.48)			29	4.08 (1.72)
PFE	39	3.52 (1.62)			30	3.65 (1.82)
FPI	36	3.42 (1.95)			25	3.14 (1.66)

PFE: patient family education

FPI: family partnership intervention

GFF: Family Assessment Device Global Family Functioning

PCS-MEDS: perceived competence taking medicines

PCS-DIET: perceived competence for diet

TSRQ-AUTO-MEDS: treatment self-regulation taking medicines – autonomous

TSRQ-AUTO-DIET: treatment self-regulation for diet – autonomous

TSRQ-CON-MEDS: treatment self-regulation taking medicines – controlled

TSRQ-CON-DIET: treatment self-regulation for diet – controlled

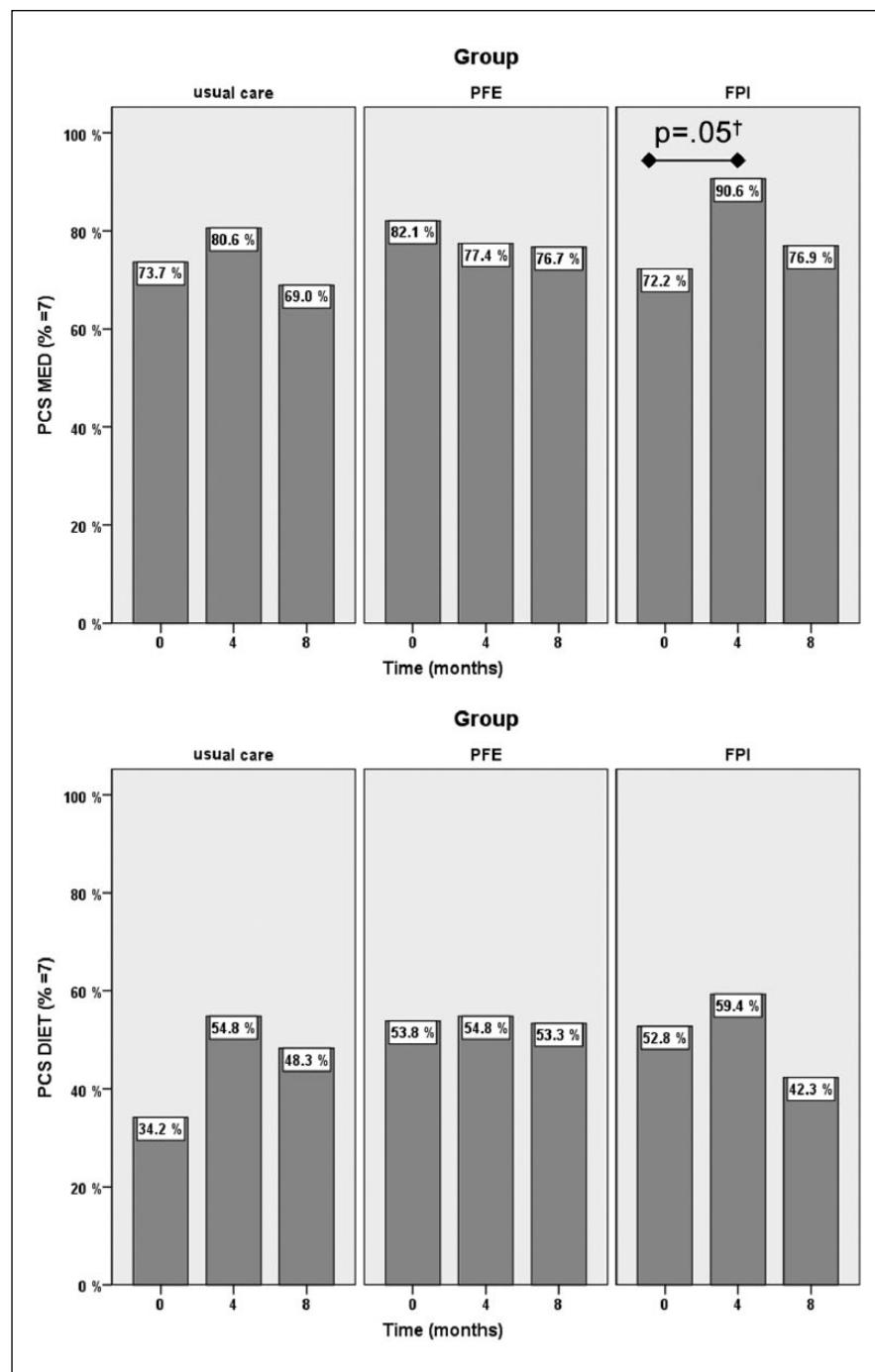
mo: months

<sup>a</sup>PCS-MEDS and PCS-DIET were dichotomized since the underlying distributions were highly skewed with the majority of the scores either <7 (LOW confidence) or =7 (HIGH confidence) [% reported within group]<sup>b</sup>TSRQ-AUTO-MEDS and TSRQ-AUTO-DIET were dichotomized since the underlying distributions were highly skewed with the majority of the scores either <7 (LOW self-regulation) or =7 (HIGH self-regulation) [% reported within group].<sup>c</sup>NOTE: TSRQ measures were not collected at 4mo only at baseline and 8mo.

Across all three groups there was an overall increase in the proportion of participants with high autonomous motivation for medications and diet from baseline to eight months (Table 3, time effect  $p=0.001$  (MEDS);  $p=0.009$  (DIET)). Relative to the significant time effect, post hoc testing revealed significant increases for the FPI group ( $p=0.004$ , moderate ES=0.42) with modest increases in the proportion of participants scoring high for autonomous motivation for medications in the PFE group ( $p=0.06$ , small ES=0.28) (Figure 3). There was an increase in high autonomous motivation for diet from baseline to eight months (Table 3), but this was only significant for the FPI

group ( $p=0.01$ , small-to-moderate ES=0.37), after adjusting for the covariate of baseline family functioning. The FPI group showed marked improvement regardless of levels of family functioning whereas the PFE group exhibited only slight improvements in autonomous motivation for medications and diet, which was primarily for those with better family functioning (GFF≤2).

A significant increase across time in the treatment self-regulation (controlled) medication adherence scores (Table 3) was observed for UC ( $p=0.015$ , small-to-moderate ES=0.36), but not for PFE or FPI groups. For controlled motivation for diet, the changes over time were not significant, however by



**Figure 2.** PCS meds and diet: percentages HIGH (=7) for each group and time point.

†Post hoc test of time within FPI group (Sidak adjusted p-value); baseline family functioning adjusted for as a covariate.

eight months after adjusting for family functioning at baseline, UC scores were significantly higher than FPI ( $p=0.05$ , small ES=0.29).

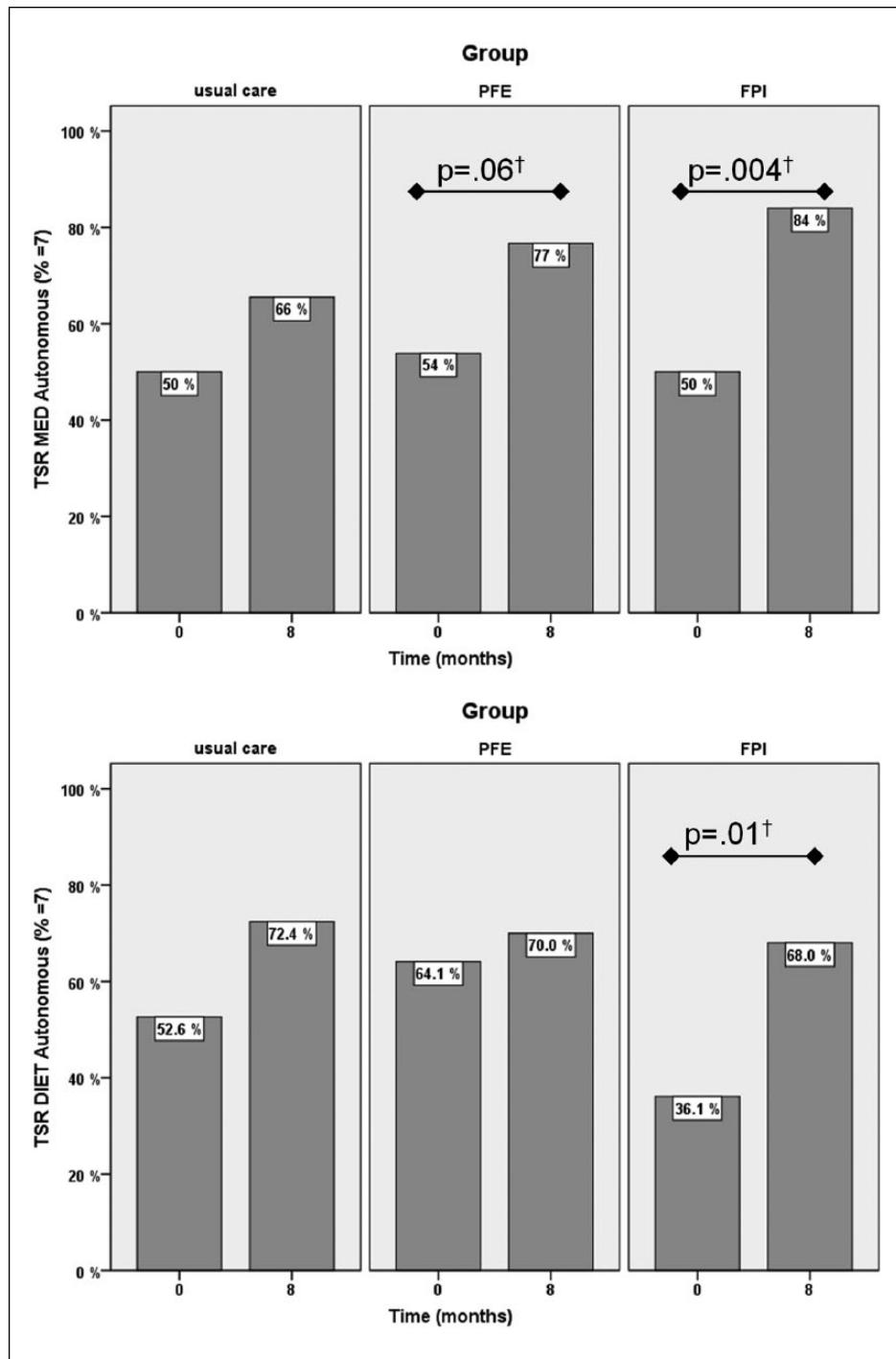
## Discussion

Our results indicate that family functioning plays an important role in the HF patient's perception of confidence and autonomous motivation for performing their self-care.

Those with poor family functioning had lower levels of self-care confidence and autonomous motivation for adhering to their medications and diet. These factors are further explained below.

### Family functioning

Participants with poor family functioning had lower levels of confidence and autonomous motivation for diet and



**Figure 3.** TSR autonomous meds and diet: percentages HIGH (=7) for each group and time point.

<sup>†</sup>Post hoc test of time within FPI group (Sidak adjusted p-value); baseline family functioning adjusted for as a covariate.

medication adherence. Our results are congruent with other studies that indicate family functioning plays a role in both patient's and FMs confidence for performing HF self-care.<sup>9,33</sup> We did not expect a significant change in family functioning overtime in the FPI group, because this is a more stable variable, and this is what we observed. Understanding baseline family functioning could guide

researchers attempting to provide a FM self-care intervention at the proper dose and duration to produce sustainable adherence in HF patients. It may be important to know more about the family functioning when implementing family focused interventions or to inform which patient/FM needs a more intense self-care intervention and who may be successful with education alone.

### ***Perceived confidence for medications and diet***

Many chronically ill patients report low confidence for medication adherence.<sup>34–36</sup> Yet, in this study we found that the participants reported a high level of confidence for medication adherence at baseline. Additionally, those with better family functioning had higher confidence for medication adherence than those with poor family functioning. FMs serve as an important source of support for HF patients with regards to medication adherence,<sup>14,37</sup> which was supported in our study as all groups started out with high confidence for medication adherence yet the more intense FPI further improved their confidence for this behavior. Of interest and concern was the decrease in confidence for medication adherence occurring in UC at eight months given prior studies showing patient's attitudes and beliefs about medications are a strong predictor of adherence.<sup>12,27–29</sup> When self-care is successfully completed with support, encouragement and less criticism from the FM, the patient can continue to gain confidence and develop autonomous motivation for sustaining adherence.<sup>1,14,15,25,38</sup> However, we did find that each of the three groups decreased their confidence for medication adherence at eight-months. A possible reason was that a stronger booster intervention might have been needed during the maintenance phase or for a longer period of time.

We found a non-significant trend for increased confidence in diet adherence among participants in all three groups even though prior research has reported a decreased level of confidence in how to shop for and cook low-sodium foods.<sup>39</sup> Additionally, social situations such as family events, weddings, and holidays with limited low-salt options make it difficult to follow the recommended diet.<sup>39</sup> This type of diet requires knowledge, family support, and autonomous motivation to do so and our study reinforces previous work that show this particular self-care behavior is difficult to follow.<sup>16,23</sup> The FPI was shown to reduce dietary sodium intake more quickly over the PFE and UC,<sup>11</sup> and greater efforts to improve confidence may be needed for longer durations to see positive outcomes.

### ***Treatment self-regulation (autonomous) for medications and diet***

Both of our intervention groups showed a significant increase in autonomous motivation for medications from baseline to eight months. A possible explanation for this finding was that both groups received education and counseling whereas the UC received educational pamphlets alone. This finding is consistent with the literature that education alone does not improve self-care outcomes,<sup>40,41</sup> and lends support to the better outcome with the more intense FPI.

For diet adherence, only the FPI group showed a significant increase in autonomous regulation from baseline

to eight months. Since the FPI group received intensive education on self-care and autonomy support, the FMs randomized to this group may have verbalized less judgment and given more control to the patient regarding their low-sodium food choices. These findings are consistent with the literature concerning family functioning, perceived criticism, and autonomy support being directly, and indirectly, linked to cardiovascular risk reduction behaviors.<sup>16,42</sup> Conversely those in the PFE group with poor family functioning at baseline did not show significant changes in their level of autonomous motivation for diet adherence. Family communication and problem-solving interventions such as the FPI to produce greater levels of autonomous motivation overtime should be refined and further tested.

### ***Treatment self-regulation (controlled) for medications and diet***

Individuals that perceive negative judgment/controlling demands from their FM may complete their self-care, but are at high risk of long-term non-adherence.<sup>15,25</sup> However in the FPI group, the controlled regulation for low-sodium diet adherence significantly decreased compared to PFE or UC reflecting the benefits of the FPI. These findings are congruent with Agren et. al, who conducted a dyadic study consisting of HF patients and a caregiver partner and found that problem-solving education and psychosocial support did enhance perceived control for patients with HF.<sup>43</sup>

The limitations of this study included participant attrition, which reduced the power and possibility of detecting significant findings at eight months. Second, treatment self-regulation was only measured at baseline and eight months, and measurement at four months may have provided additional information about the immediate intervention effects on autonomous versus controlled regulation for low-sodium diet and medication adherence. The selection of only one FM for the dyad intervention likely did not transfer communication skills to the whole family context; however, we believe selecting the person most involved in the HF patients care was essential.

## **Conclusion**

The findings from this study have important implications for researchers conducting family focused interventions with HF patients. Level of family functioning should be considered as an important factor when developing self-care interventions. Poor family functioning contributes to lower levels of self-care confidence; autonomous motivation and increased levels of controlled motivation in patients with HF. Confidence and motivation for self-care were enhanced by FPI, regardless of level of family functioning. Confidence (e.g. self-efficacy) and motivation (autonomous and controlled) are important factors to

consider in the design of an education and family focused intervention to improve HF self-care.

### Implications for Practice

- Understanding how a family functions and overall family context may direct improved heart failure education and counselling
- Poor family functioning contributes to poor heart failure self-care
- Family-partnership interventions promotes self-care confidence and motivation in heart failure patients
- Better family functioning promotes self-care confidence
- Poor family functioning is associated with controlled motivation and low self-care adherence

### Conflict of interest

None declared.

### Funding

This study was supported by (1) "A Family Partnership Intervention for Heart Failure," (RO1 R08800) National Institute of Nursing Research, NIH 07/01/04-11/30/09, PI: S. Dunbar and in part by PHS Grant UL1 RR025008 from the Clinical and Translational Science Award Program, National Institutes of Health, National Center for Research Resources, and the Atlanta Veterans Administration Medical Center. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. We acknowledge Judy Robinson, RN, MSN, Kendaly Meadows, RN, MA, Bridget Fielder, RN, MSN and Christina Quinn, RN, PhD for their outstanding contributions to this project.

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