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The Role of Gratitude in Spiritual Well-Being in Asymptomatic Heart Failure Patients

Paul J. Mills, Laura Redwine, Kathleen Wilson, Meredith A. Pung, Kelly Chinh, Barry H. Greenberg, Ottar Lunde, Alan Maisel, and Ajit Raisinghani
University of California, San Diego

Alex Wood
University of Stirling

Deepak Chopra
University of California, San Diego, and
Chopra Center for Wellbeing, Carlsbad, California

Spirituality and gratitude are associated with well-being. Few if any studies have examined the role of gratitude in heart failure (HF) patients or whether it is a mechanism through which spirituality may exert its beneficial effects on physical and mental health in this clinical population. This study examined associations between gratitude, spiritual well-being, sleep, mood, fatigue, cardiac-specific self-efficacy, and inflammation in 186 men and women with Stage B asymptomatic HF (age 66.5 years ± 10). In correlational analysis, gratitude was associated with better sleep ($r = -.25$, $p < .01$), less depressed mood ($r = -.41$, $p < .01$), less fatigue ($r = -.46$, $p < .01$), and better self-efficacy to maintain cardiac function ($r = .42$, $p < .01$). Patients expressing more gratitude also had lower levels of inflammatory biomarkers ($r = -.17$, $p < .05$). We further explored relationships among these variables by examining a putative pathway to determine whether spirituality exerts its beneficial effects through gratitude. We found that gratitude fully mediated the relationship between spiritual well-being and sleep quality ($z = -2.35$, $SE = .03$, $p = .02$) and also the relationship between spiritual well-being and depressed mood ($z = -4.00$, $SE = .075$, $p < .001$). Gratitude also partially mediated the relationships between spiritual well-being and fatigue ($z = -3.85$, $SE = .18$, $p < .001$) and between spiritual well-being and self-efficacy ($z = 2.91$, $SE = .04$, $p = .003$). In sum, we report that gratitude and spiritual well-being are related to better mood and sleep, less fatigue, and more self-efficacy, and that gratitude fully or partially mediates the beneficial effects of spiritual well-being on these endpoints. Efforts to increase gratitude may be a treatment for improving well-being in HF patients' lives and be of potential clinical value.

Keywords: heart failure, gratitude, spiritual well-being, inflammation

Paul J. Mills, Department of Family Medicine and Public Health, Department of Psychiatry, and UC San Diego Center of Excellence for Research and Training in Global Integrative Health, University of California, San Diego, and Chopra Center for Wellbeing, Carlsbad, California; Laura Redwine, Department of Psychiatry and UC San Diego Center of Excellence for Research and Training in Global Integrative Health, University of California, San Diego; Kathleen Wilson and Meredith A. Pung, Department of Family Medicine and Public Health, University of California, San Diego; Kelly Chinh, Department of Psychiatry, University of California, San Diego; Barry H. Greenberg, Ottar Lunde, Alan Maisel, and Ajit Raisinghani, Department of Medicine, University of California, San Diego; Alex Wood, Department of Behavioral Science, University of Stirling; Deepak Chopra, Department of Family Medicine and Public Health, University of California, San Diego, and Chopra Center for Wellbeing.

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Correspondence concerning this article should be addressed to Paul J. Mills, UCSD, 9500 Gilman Drive #0725, La Jolla, CA 92093-0725. E-mail: pmills@ucsd.edu

> Gratitude unlocks the fullness of life. . . . It turns denial into acceptance, chaos into order, confusion into clarity. . . . It turns problems into gifts, failures into success, and mistakes into important events. Gratitude makes sense of our past, brings peace for today, and creates a vision for tomorrow.
>
> —Melodie Beattie

Heart failure (HF) is a major public health concern, affecting over 6 million Americans, with rates expected to nearly triple over the next few decades as the population ages (Krum & Stewart, 2006). It is the end stage of most cardiac anomalies, with the annual number of hospitalizations exceeding 1 million, and direct costs in the United States exceeding $40 billion/year (Desai & Stevenson, 2012; Wang, Zhang, Ayala, Wall, & Fang, 2010).

In the field of behavioral cardiology (Rozanski, 2014), there is increasing interest in examining associations between positive psychological attributes such as spirituality and gratitude, potential mechanisms of their action, and importantly, associations with clinical outcomes (Dubois et al., 2012; Huffman et al., 2011; Sacco, Park, Suresh, & Bliss, 2014). In many populations, spirituality or religious wellness are associated with better mental and physical health. In a recent meta-analytic review, for example, Bonelli and Koenig (2013) reported that religious–spiritual involvement is correlated with better mental health, including less depression (Bonelli & Koenig, 2013), although such associations are not always observed (Morgenstern et al., 2011). In patients with symptomatic HF, there is a positive correlation between spiritual well-being and better mental health (Whelan-Gales, Quinn Griffin, Maloni, & Fitzpatrick, 2009). In addition, symptomatic HF patients with higher measures of spiritual well-being have better HF-related health status (Bekelman et al., 2009).

Therapeutically, there is increasing recognition of the value of embracing multidisciplinary therapeutic approaches in HF that include spirituality as part of more routine psychosocial support (Naghi, Philip, Phan, Cleenewerck, & Schwarz, 2012). Spirituality-based interventions for improving mood and well-being in cardiovascular disease populations have shown promising outcomes and demonstrated good adherence in several pilot studies. For example, Delaney, Barrere, and Helming (2011) reported reduced depression scores among community-dwelling patients with cardiovascular disease following an individualized 1-month spirituality-based intervention on health-related outcomes. Warber et al. (2011) examined the effects of a nondenominational spiritual retreat on depression and other measures of well-being in postacute coronary syndrome patients. A 4-day spiritual retreat intervention included guided imagery, meditation, drumming, journal writing, and nature-based activities. A control intervention included nutrition education, exercise, and stress management. Both retreat groups received follow-up phone coaching biweekly for up to 3 months. Compared with the control group, patients assigned to the spiritual retreat group had significantly lower depression scores postintervention, which were maintained 3 months later.

Gratitude is considered a positive psychological factor that has also been associated with well-being in some populations. According to Büssing et al. (2014), in clinical populations feelings of gratitude and awe facilitate perceptions and cognitions that go beyond the focus of the illness and include positive aspects of one's personal and interpersonal reality, even in the face of disease. According to Wood, Froh, and Geraghty (2010), gratitude is part of a wider life orientation toward noticing and appreciating the positive aspects of life. Gratitude can be attributed to an external source such as an animal, person, or nonhuman (e.g., God, the cosmos), and may be part of a vaster perspective of noticing and appreciating the positive in the world (Wood et al., 2010). There are individual differences in dispositional gratitude, which entails how frequently and intensely people experience the emotion of gratitude, the range of events which elicit the emotion, and in the interpretation of social situations (McCullough, Emmons, & Tsang, 2002; Wood, Maltby, Stewart, Linley, & Joseph, 2008). Longitudinal studies suggest that higher levels of gratitude are directly linked to improvements in perceived social support as well as reduced stress and depression, and that these direct effects are not explained by personality factors (Wood et al., 2008).

Gratitude has theological origins and the importance of its development and practice is emphasized in the majority of world religions. Prayer frequency has been found to increase gratitude (Lambert, Graham, & Fincham, 2009), and in this way gratitude may serve as a

pathway through which spirituality exerts its known positive effects on physical and mental health.

The American College of Cardiology/American Heart Association (ACC/AHA) HF staging system denotes *Stage B patients* as asymptomatic but at high risk for developing symptomatic (Stage C) HF (Hunt et al., 2005a). Stage B consists of patients who have developed structural heart disease (e.g., previous myocardial infarction, asymptomatic valvular disease) with specific left ventricular (LV) dysfunction that is associated with inflammation and the development of HF but who have never shown signs or symptoms of HF. Stage C HF further includes both structural or functional abnormality, increased inflammation, and exercise limitation from dyspnea or fatigue, whereas Stage D includes severe "end-stage" HF (Eisen, Benderly, Behar, Goldbourt, & Haim, 2014; Viganego & Le Jemtel, 2007). The ACC/AHA HF staging system emphasizes both the evolution and the progression of chronic HF and seeks to identify and implement early therapeutic interventions to ultimately reduce morbidity and mortality (Hunt et al., 2005b). The Stage B level of disease presents an important therapeutic window into potentially halting disease progression and improving quality of life. Progression from Stage B HF to symptomatic HF is associated with a fivefold increase in mortality risk (Ammar et al., 2007).

Within the growing field of studying relationships between gratitude and well-being, few studies have examined HF populations, and this is despite recent studies describing the importance of psychosocial resources such as gratitude in alleviating the struggles associated with living with symptomatic HF (Sacco et al., 2014). The purpose of this study therefore was to examine associations between spiritual well-being, gratitude, and physical and mental health in Stage B HF patients and to examine a potential pathway (i.e., gratitude) through which spiritual well-being may promote physical and mental health benefits.

Method

Participants

The sample consisted of 186 men and women with AHA/ACC classification Stage B HF with a diagnosis for at least 3 months. Patients were recruited from the cardiology clinics at the University of California San Diego Medical Centers and the Veterans Affairs San Diego Health care System (VASDHS). Presence of Stage B HF was defined as structural heart disease based on recommendations and cut-points from the American Society of Echocardiography guidelines (Lang et al., 2005), including *LV hypertrophy* (defined as mean LV wall thickness of septum and posterior wall $\geq$12 mm), *LV enlargement* (at least moderate in severity, defined as LV end diastolic diameter $\geq$64 mm in men or $\geq$58 mm in women, or LV mass index $\geq$132 in men or $\geq$109 in women), *LV systolic dysfunction* (defined as LV ejection fraction $<$55% or wall motion abnormality), *LV diastolic dysfunction*, asymptomatic valvular heart disease of at least moderate severity, or previous myocardial infarction, but without signs or symptoms of HF. Left ventricular ejection fraction (%LVEF) was assessed by echocardiography as part of the patient's routine medical evaluation.

Protocol

The protocol was approved by the UCSD and VASDHS Institutional Review Boards and participants gave written informed consent. The study was carried out in accordance with the Declaration of Helsinki principles. On presentation to the laboratory, a blood draw was obtained using a 21- or 23-gauge butterfly needle and participants completed a packet of psychosocial questionnaires.

Measures

Gratitude. Gratitude was assessed with the GQ–6 (Froh et al., 2011; McCullough et al., 2002). The GQ–6 is a psychometrically sound self-administered 6-item scale designed to measure trait gratitude. Internal consistency of the GQ–6 in this cardiac population was high, with a Cronbach's alpha of 0.92.

Spiritual well-being. The Functional Assessment of Chronic Illness Therapy Spiritual Well-Being Scale (FACIT–SP12) was used to assess spiritual well-being (Peterman, Fitchett, Brady, Hernandez, & Cella, 2002). The FACIT–SP12 is a 12-item scale designed to measure the extent to which patients experienced spiritual

well-being over the previous week. Internal consistency reliability coefficients have ranged from .81 to .88, and convergent validity estimates show moderate to strong correlations with other measures of spirituality and religiousness (Peterman et al., 2002). In this cohort, Cronbach's alpha for the FACIT–SP12 was 0.85.

Depressive symptom severity. Symptoms of depression were assessed with the 21-item Beck Depression Inventory (BDI–IA), where scores ≥10 indicate possible clinical depression (Beck, 1978). The BDI–IA assesses symptoms related to sadness, feelings of guilt, suicidal ideation, and changes in appetite and body weight, among other characteristics. The BDI–IA shows high reliability and structural validity and capacity to discriminate between depressed and nondepressed participants with broad applicability for research and clinical practice worldwide (Wang & Gorenstein, 2013). The BDI–IA Cronbach's alpha for this sample was 0.85.

Sleep quality. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality (Smyth, 2000). The PSQI is widely used in sleep research and measures sleep disturbance and usual sleep habits and has high internal reliability and construct validity (Carpenter & Andrykowski, 1998). In addition to component scores in domains of subjective sleep quality, latency and duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction, the PSQI also yields a global score (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Cronbach's alpha for the PSQI global score was 0.83.

Fatigue. The Multidimensional Fatigue Symptom Inventory–Short Form (MFSI) was used to assess total fatigue (Stein, Jacobsen, Blanchard, & Thors, 2004). The MFSI has strong psychometric properties and is useful in medically ill and nonmedically ill individuals (Donovan et al., 2014). Cronbach's alpha for the MFSI was 0.87.

Self-efficacy. The Cardiac Self-Efficacy Questionnaire (CSEQ) examines the role of patient self-efficacy for patients with coronary heart disease. The CSEQ has two factors (*control symptoms* and *maintain function*) and has high internal consistency and good convergent and discriminant validity (Sullivan, LaCroix, Russo, & Katon, 1998). We used the CSEQ-Maintain Function subscale, and Cronbach's alpha was 0.85.

Inflammatory markers. Inflammation is implicated in the pathogenesis of HF and inflammatory biomarkers are used for risk stratification and prognosis (Bouras et al., 2014). We therefore assessed a relevant panel of inflammatory biomarkers known to be involved in adverse remodeling of the heart and the progression to heart failure, including CRP, TNF-α, IL-6, IFN-gamma & ST2 (Cosper, Harvey, & Leinwand, 2012; Huang, Yang, Xiang, & Wang, 2014; Seljeflot, Nilsson, Westheim, Bratseth, & Arnesen, 2011; Sun et al., 2014). Whole blood was preserved with EDTA, and following centrifugation, the plasma was stored at −80 °C until assay. Circulating levels of these biomarkers were determined by commercial ELISA (Meso Scale Discovery, Rockville, MD). Intra- and interassay coefficients were <5%.

Statistical Analyses

Prior to statistical analyses all data were tested for normality and homogeneity of variance using the Kolmogorov–Smirnov test; no transformations were conducted. Correlational and mediation analyses were run using SPSS software packages (Version 22.0; IBM, Armonk, NY). The SPSS Dimension Reduction factor analysis program was used to calculate a composite inflammatory index score comprised of circulating levels of CRP, TNF-α, IL-6, IFN-gamma & ST2. The resultant factor score Eigenvalue was 3.23, accounting for 53.8% of inflammatory variance. We examined mediation using the approach outlined by Baron and Kenny (1986). Using this mediation strategy, we ran a series of regression analyses were run: first regressing the dependent variable on the independent variable (Step 1/Path *c*), next regressing the mediating variable on the independent variable (Step 2/Path *a*), and last regressing the dependent variable on both the mediating variable (Step 3/Path *b*) and the independent variable (Step 4/Path *c'*). We further examined the significance of the product of the path coefficients [(a^*b) an estimate of the indirect effect] using the Sobel test (Sobel, 1982).

Results

Table 1 presents biological, medical, psychosocial, and inflammatory biomarker characteristics of the patients.

Correlational Analyses

Gratitude was associated with better sleep ($p < .01$), less depressed mood ($p < .01$), less fatigue ($p < .01$), and better self-efficacy to maintain cardiac function ($p < .01$). Patients expressing more gratitude also had lower levels of the inflammatory biomarker index ($p < .05$).

Table 1
Sociodemographic, Medical, Psychosocial, and Inflammatory Biomarker Characteristics of Study Participants (N = 186)

Characteristic	*M*/% (*SD*)
Age (in years)	66.4 (10.3)
Body mass index (kg/m^2)	30.2 (5.6)
Gender (men)	95.3%
Systolic blood pressure (mmHg)	134.2 (18.8)
Diastolic blood pressure (mmHg)	77.1 (11.9)
Left ventricular ejection fraction	64.8% (8.95)
Concomitant disease	
Diabetes mellitus	30.4%
Myocardial infarction	17%
Medications	
ACE inhibitors	39.1%
Beta blockers	44.2%
Calcium channel blockers score	20.1%
Statin	55.0%
Aspirin	39.0%
Diuretics	32.1%
Anti-arrhythmic	3.9%
Warfarin	10.6%
Digoxin	2.0%
Psychosocial	
Gratitude Questionnaire (GQ–6)	5.65 ± 1.09
Functional Assessment of Chronic Illness Therapy Spiritual Well-Being Scale (FACIT–SP12)	12.07 ± 5.71
Beck Depression Inventory (BDI–IA)	8.84 ± 8.14
Pittsburgh Sleep Quality Index (PSQI)	8.92 ± 3.32
Multidimensional Fatigue Symptom Inventory—Short Form (MFSI-SF)	29.69 ± 21
Cardiac Self-Efficacy Questionnaire—Maintain Function subscale	16.08 ± 4.94
Inflammatory biomarkers	
CRP (mg/dl)	6.04 (9.2)
IL-6 (pg/ml)	2.21 (2.1)
TNF-α (pg/ml)	4.25 (3.0)
IFN-gamma (ng/ml)	2.39 (5.3)
ST-2 (pg/ml)	17.9 (8.2)

Spiritual well-being was associated with better sleep $p < .01$), less depressed mood ($p < .01$), less fatigue ($p < .01$), and better self-efficacy to maintain cardiac function ($p < .01$; see Table 2).

Gratitude as a Mediator of the Relationship Between Spirituality and Physical and Mental Health

Mediation analyses were conducted to examine whether gratitude mediates the relationship between spiritual well-being and aspects of physical and mental health. These effects were as follows (Figures 1 and 2):

Sleep. In Step 1 of the mediation model, the regression of subjective sleep quality (PSQI) on spiritual well-being (FACIT–SP12) was significant ($R^2 = .08$, $\beta = -.284$), $t(166) = -3.82$, $p < .001$. Step 2 showed that the regression of spiritual well-being (FACIT–SP12) on the mediator, trait gratitude (GQ–6), was also significant ($R^2 = .31$, $\beta = .552$), $t(169) = 8.58$, $p < .001$. Step 3 of the mediation process showed that the mediator, trait gratitude (GQ–6), controlling spiritual well-being (FACIT–SP12), was significantly related to sleep quality (PSQI; $R^2 = .11$, $\beta = -.213$), $t(167) = -2.42$, $p = .02$. Step 4 of the analyses revealed that, when controlling for trait gratitude (GQ–6), spiritual well-being (FACIT–SP12) no longer remained a significant predictor of subjective sleep quality (PSQI; $R^2 = .11$, $\beta = -.167$), $t(167) = 1.89$, $p = .06$, indicating that the beneficial effect of spirituality on sleep exerts its effect through gratitude. We further examined the strength of the indirect or mediated effect using the Sobel test and confirmed its significance ($z = -2.35$, $SE = .03$, $p = .02$).

Depressed mood. In Step 1, we regressed depressed mood (BDI–IA) on spiritual well-being (FACIT–SP12) and this relationship was significant ($R^2 = .13$, $\beta = -.355$), $t(157) = -4.765$, $p < .001$. Step 2 outputs are the same in all four mediation models. Step 3 demonstrated that the mediator, trait gratitude (GQ–6) was related to depressed mood (BDI–IA) when controlling for spiritual well-being (FACIT–SP12; $R^2 = .23$, $\beta = -3.84$), $t(158) = -4.536$, $p < .001$. Step 4 indicated that when controlling for trait gratitude (GQ–6), the relationship between spiritual well-being (FACIT–SP12) and depressed mood (BDI–IA) is no longer signifi-

Table 2
Correlations Among Administered Questionnaires

Instrument	Gratitude Questionnaire (GQ–6)	Spiritual Well-Being Scale (FACIT–SP12)
Gratitude Questionnaire (GQ–6)		
Spiritual Well-Being Scale (FACIT–SP12)	.55**	
Beck Depression Inventory (BDI–IA)	–.46**	–.35**
Pittsburgh Sleep Quality Index (PSQI)	–.32**	–.28**
Multidimensional Fatigue Symptom Inventory—Short Form (MFSI-SF)	–.50**	–.50**
Cardiac Self-Efficacy Questionnaire–Maintain Function subscale (CSEQ-MF)	.43**	.46***
Inflammatory Index (CRP, TNF-α, IL-6, IFN-gamma & ST2)	–.17*	–.10

* $p < .05$. ** $p < .01$. *** $p < .001$.

cant ($R^2 = .23$, $\beta = -.384$), $t(156) = -1.663$, $p = .10$, indicating that gratitude fully mediates the relationship between spiritual well-being and depressed mood. We again confirmed the significance of the mediation using the Sobel test ($z = -4.00$, $SE = .075$, $p < .001$).

Fatigue. When examining fatigue (MFSI), there was again evidence of relationship with spiritual well-being (FACIT–SP12; $R^2 = .25$, $\beta = -.499$), $t(163) = -7.342$, $p < .001$, in Step 1, and Step 3 again demonstrated a relationship between trait gratitude (GQ–6) and fatigue (MFSI) when controlling for spiritual well-being (FACIT–SP12; $R^2 = .33$, $\beta = -.335$), $t(162) = -4.318$, $p < .001$. However, Step 4 revealed that the relationship between

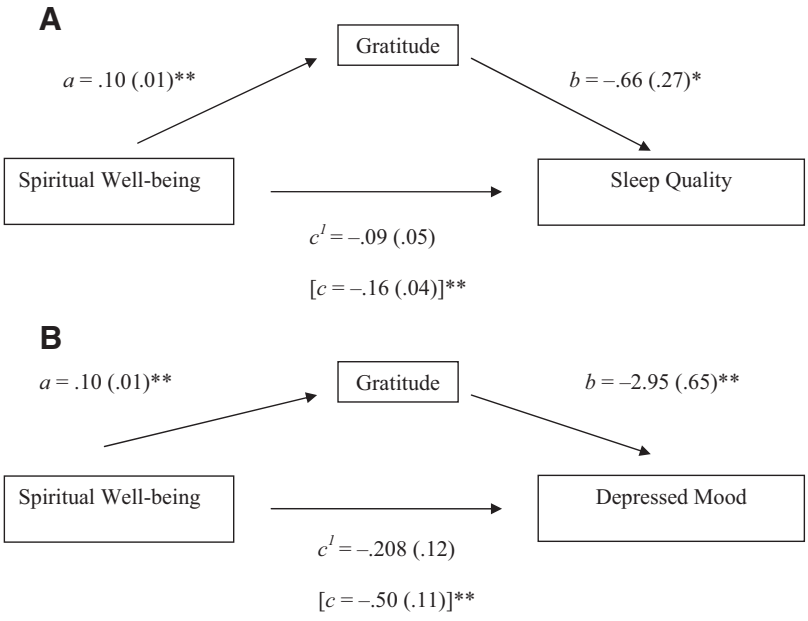

Figure 1. Trait gratitude significantly mediated the relationships between spiritual well-being and sleep quality and spiritual well-being and depressed mood. Path values are unstandardized regression coefficients with standard errors in parentheses. Mediated (indirect) effects were derived from the product of paths *a* and *b* and examined using the Sobel test (1982). Panel A: Trait gratitude fully mediated the relationship between spiritual well-being and sleep quality ($z = -2.45$, $SE = .03$, $p = .02$). Panel B: Trait gratitude fully mediated the relationship between spiritual well-being and depressed mood ($z = -4.00$, $SE = .08$, $p < .001$). * $p < .05$. ** $p < .01$.

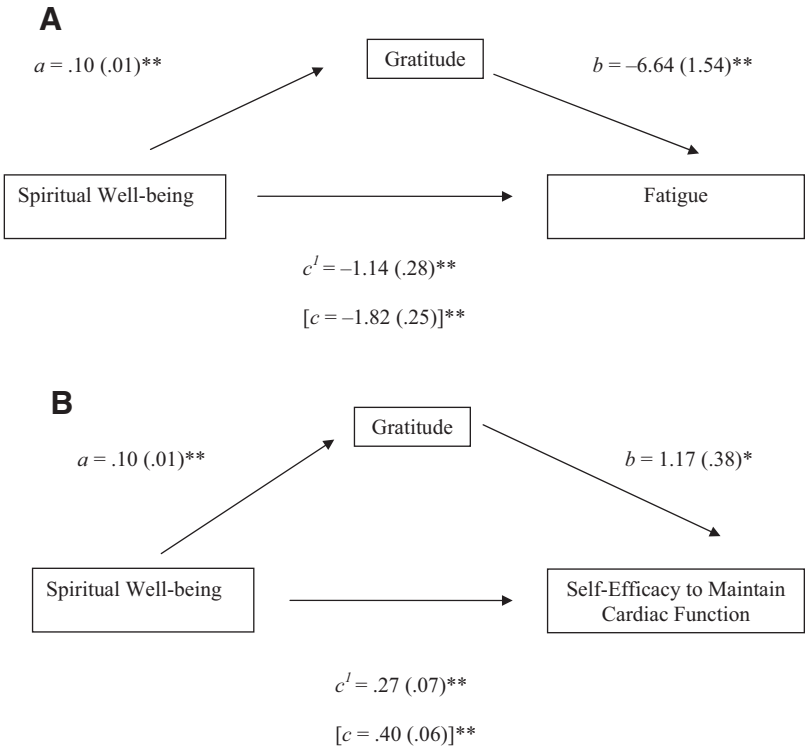

Figure 2. Trait gratitude significantly mediated the relationships between spiritual well-being and fatigue and spiritual well-being and self-efficacy to maintain cardiac function. Path values are unstandardized regression coefficients with standard errors in parentheses. Mediated (indirect) effects were derived from the product of paths *a* and *b* and examined using the Sobel test (1982). Panel A: Trait gratitude partially mediated the relationship between spiritual well-being and fatigue ($z = -3.849$, $SE = .18$, $p < .001$). Panel B: Trait gratitude partially mediated the relationship between spiritual well-being and cardiac-specific self-efficacy ($z = 2.91$, $SE = .04$, $p < .01$). * $p < .05$. ** $p < .01$.

spiritual well-being (FACIT–SP12) and fatigue (MFSI) remains significant controlling for the putative mediator, gratitude (GQ–6; $R^2 = .33$, $\beta = -.312$), $t(162) = -4.020$, $p < .001$. Although the c^1 path remains significant, the Sobel test of the indirect or mediated pathway was also significant ($z = -3.85$, $SE = .18$, $p < .001$), providing evidence to suggest that gratitude partially mediates the relationship between spiritual well-being and fatigue.

Self-efficacy to maintain cardiac function. In our analyses examining self-efficacy to maintain cardiac function (CSEQ), in Step 1 there was a significant relationship with spiritual well-being (FACIT–SP12; $R^2 = .21$, $\beta = .456$), $t(159) = 6.453$, $p < .001$. In Step 3, there was evidence of a relationship between trait gratitude (GQ–6) and self-efficacy to maintain cardiac function (CSEQ) when controlling for spiritual well-being (FACIT–SP12; $R^2 = .25$, $\beta = .256$), $t(158) = 3.10$, $p = .002$. In Step 4, the relationship between spiritual well-being (FACIT–SP12) and self-efficacy to maintain cardiac function (CSEQ) remains significant when controlling for our hypothesized mediator, gratitude (GQ–6; $R^2 = .25$, $\beta = .314$), $t(158) = 3.087$, $p < .001$. Again though, the Sobel test of the indirect or mediated pathway was also significant ($z = 2.91$, $SE = .04$, $p = .003$), suggesting that gratitude partially mediates the relationship between spirituality and cardiac-specific self-efficacy.

Inflammatory index. In our mediation analyses examining inflammation, there was no

relationship between spiritual well-being and the inflammatory index ($R^2 = .01$, $\beta = -1.02$), $t(140) = -1.21$, $p = 23$. Similarly, Steps 3 and 4 of the mediation analyses were not significant and consequently no relationship between spirituality and inflammation for gratitude to potentially mediate.

Discussion

In Stage B asymptomatic HF patients, we found that gratitude was related to better mood and sleep, more self-efficacy, and lower fatigue and inflammation. Spiritual well-being was related to each of these as well, with the exception of the inflammatory index. When examining these relationships in more depth, we found that gratitude fully mediated the beneficial effects of spiritual well-being on sleep and depressed mood and partially mediated the relationships between spiritual well-being and fatigue and spiritual well-being and cardiac-specific self-efficacy. Stage B patients are asymptomatic but at high risk for developing symptomatic (Stage C) HF, and thus present an opportunity to implement early therapeutic interventions to ultimately reduce morbidity and mortality (Hunt et al., 2005b). Interventions designed to increase gratitude do improve psychological well-being (Wood et al., 2010).

Research findings from gratitude studies suggest that gratitude, because of its orientation toward positive appraisal, is likely incompatible with the "negative triad" of beliefs associated with depression (Evans et al., 2005). Indeed, gratitude is related to both hedonic well-being (i.e., *subjective well-being*, which is characterized by higher positive affect, lower negative affect, and life satisfaction) and eudaimonic well-being (i.e., *psychological well-being*, which is characterized by aspects such as environmental mastery, personal autonomy, purpose in life, positive relations with others, and personal growth (Evans et al., 2005; Ryff & Keyes, 1995). In turn, both hedonic and eudaimonic well-being have been linked to reduced likelihood of depression (e.g., Pressman & Cohen, 2005; Wood et al., 2008), as well as alterations in immune function associated with improved health (Ryff, Singer, & Dienberg Love, 2004). Thus one potential pathway by which gratitude may promote well-being, as well as better cardiovascular health in HF, is through the enhancement of both subjective (hedonic) and psychological (eudaimonic) well-being (Wood et al., 2010). It is important to note that a recent review reports that well-being is associated with improved cardiovascular health, with hedonic well-being noted to be associated with improved biological function and restorative health behaviors; the authors noted a need for more data on the potential impact of eudaimonic well-being on cardiovascular outcomes (Boehm & Kubzansky, 2012).

Another potential pathway by which gratitude may enhance health is via shifts in affective perceptions of daily life events from negative to positive. The chronic hassles and uplifts scale is an index of daily perceptions of events as either hassles (negative) or uplifts (positive), and has been found to correlate with mood, health, and positive affect (Folkman & Lazarus, 1988). In a study by our group, we reported independent relationships of uplifts (frequency and intensity) and inflammatory markers that were independent of sociodemographic, behavioral, medical and psychological variables such as hassles, depression, and perceived stress. (Jain, Mills, von Kanel, Hong, & Dimsdale, 2007), suggesting that positive perceptions of daily life events is uniquely associated with inflammation. Gratitude may reduce inflammatory markers in Stage B HF patients through changes in affective perceptions of daily life.

Gratitude was associated with lower depressed mood scores in these patients, and mediated the relationship between spiritual well-being and mood. Prior studies report that self-rated spiritual well-being is strongly and independently associated with fewer depressive symptoms in stage B HF patients (Peterman et al., 2002). This is clinically significant since the presence of depressive symptoms in cardiovascular diseases such as HF is associated with increased risk of cardiovascular hospitalization and mortality (Johnson et al., 2012; Kato et al., 2012; Rutledge, Reis, Linke, Greenberg, & Mills, 2006). Typical risk factors associated with depression in HF include increasing age, poor physical fitness, poor sleep, fatigue, and inflammation (Alosco et al., 2013; Jimenez & Mills, 2012; Kupper,

Widdershoven, & Pedersen, 2012; Mills et al., 2009; Shimizu, Suzuki, Okumura, & Yamada, 2013; Sin, 2012; Tang, Yu, & Yeh, 2010). For Stage B HF patients, finding correlates of depressive symptoms is particularly important as an avenue for potentially forestalling development of symptomatic Stage C disease, which is significantly associated with poorer quality of life and increased morbidity and mortality (Ammar et al., 2007).

In terms of gratitude interventions, in a recent double-blind randomized controlled trial in health care practitioners, Cheng, Tsui, and Lam (2014) showed that a 4-week gratitude journaling intervention, as compared with journaling about hassles, led to a significant reduction in stress and improved mood. Other interventions focusing on "thoughts of gratitude" reveal that gratitude interventions have a significant effect on improving daily positive emotions (Ouweneel, Le Blanc, & Schaufeli, 2014). Few studies, however, have examined the potential benefits of gratitude interventions for HF despite studies describing the importance of gratitude in alleviating the struggles associated with living with HF (Sacco et al., 2014). Sacco et al. developed an 8-week phone-based positive psychology intervention for patients hospitalized with acute cardiac disease (acute coronary syndrome or decompensated heart failure), which comprised positive psychology exercises adapted for this population with a focus on gratitude, optimism, and kindness. Their initial findings include that the intervention is well accepted in cardiac patients; further outcome data are pending (Sacco et al., 2014).

It is worth noting that though gratitude is considered a positive psychological factor, it is not necessarily good for all people under all circumstances, for example, displaced gratitude under conditions of exploitation; gratitude with discernment is worth cultivating. As far as the scientific literature, the vast majority of research demonstrates positive, not negative, consequences of gratitude and that cultivating gratitude doesn't necessarily reduce seeing the negative features of life but rather offers or encourages seeing the positive in life (Eaton, Bradley, & Morrissey, 2014; Wood et al., 2008).

Summary

Gratitude and spiritual well-being are key positive factors to consider in this population. We documented that an attitude of gratitude is related to better mood and sleep, less fatigue, more self-efficacy, and a lower cellular inflammatory index. Untangling these relationships further, we found that higher trait gratitude mediates spiritual well-being's positive effects on better sleep and less depressed mood (and to a lesser degree fatigue and cardiac-specific self-efficacy). These are potentially important observations because depressed mood and poor sleep are associated with worse prognosis in HF as well as other cardiac populations, and therefore interventions that increase levels of gratitude may have clinical implications for improving health outcomes (Canivet, Nilsson, Lindeberg, Karasek, & Ostergren, 2014; Huffman, Celano, Beach, Motiwala, & Januzzi, 2013; Rutledge et al., 2006). Given that interventions to increase gratitude are relatively simple and of low cost, efforts to increase gratitude in HF patients' lives may be of potential clinical value and represent a treatment target for improving well-being.

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