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Coping Styles in Heart Failure Patients with Depressive Symptoms

Ranak B. Trivedi, PhD[1], **James A. Blumenthal, PhD**[2], **Christopher O'Connor, MD**[3], **Kirkwood Adams, MD**[4], **Alan Hinderliter, MD**[4], **Carla Sueta-Dupree, MD**[4], **Kristy Johnson, MPH**[2], and **Andrew Sherwood, PhD**[2]

[1]Department of Medicine, Duke University Medical Center

[2]Department of Psychiatry and Behavioral Sciences, Duke University Medical Center

[3]Department of Cardiology, Duke University Medical Center

[4]Division of Cardiology, UNC-Chapel Hill

Abstract

Objective—Elevated depressive symptoms have been linked to poorer prognosis in heart failure (HF) patients. Our objective was to identify coping styles associated with depressive symptoms in HF patients.

Methods—222 stable HF patients (32.75% female, 45.4% non-Hispanic Black) completed multiple questionnaires. Beck Depression Inventory (BDI) assessed depressive symptoms, Life Orientation Test (LOT-R) assessed optimism, ENRICHD Social Support Inventory (ESSI) and Perceived Social Support Scale (PSSS) assessed social support, and COPE assessed coping styles. Linear regression analyses were employed to assess the association of coping styles with continuous BDI scores. Logistic regression analyses were performed using BDI scores dichotomized into BDI<10 versus BDI≥10, to identify coping styles accompanying clinically significant depressive symptoms.

Results—In linear regression models, higher BDI scores were associated with lower scores on the acceptance (β=-.14), humor (β=-.15), planning (β=-.15), and emotional support (β=-.14) subscales of the COPE, and higher scores on the behavioral disengagement (β=.41), denial (β=.33), venting (β=.25), and mental disengagement (β=.22) subscales. Higher PSSS and ESSI scores were associated with lower BDI scores (β=-.32 and -.25, respectively). Higher LOT-R scores were associated with higher BDI scores (β=.39, p<.001). In logistical regression models, BDI≥10 was associated with greater likelihood of behavioral disengagement (OR=1.3), denial (OR=1.2), mental disengagement (OR=1.3), venting (OR=1.2), and pessimism (OR=1.2), and lower perceived social support measured by PSSS (OR=.92) and ESSI (OR=.92).

Conclusion—Depressive symptoms in HF patients are associated with avoidant coping, lower perceived social support, and pessimism. Results raise the possibility that interventions designed to improve coping may reduce depressive symptoms.

Corresponding Author: Ranak B. Trivedi, PhD, 2424 Erwin Rd, Hock Plaza, Ste 1105, Box 2720, Durham, NC 27705, Ph: +1 (919) 668-2361, Fax: +1 (919) 668-1300.
Work conducted in the Department of Psychiatry and Behavioral Sciences, Duke University Medical Center, Durham, NC 27710

Keywords

Heart failure; coping; depressive symptoms

Introduction

Depressive symptoms are common in patients with heart failure (HF), affecting an estimated 42-77% of the clinical population.[1, 2] The presence of depressive symptoms in HF patients is associated with increased risk of hospitalization and mortality.[3-5] Although HF severity and disability may impact the onset and maintenance of depressive symptoms,[6] they do not fully account for them suggesting that non-disease psychosocial factors may contribute to the high incidence of depressive symptoms. If modifiable, these factors may be targeted an intervention to reduce depressive symptomatology, and ultimately, impact clinical outcomes in HF patients. Three such factors deserving closer attention are coping styles, social support, and optimism.

Evidence from other chronic illnesses suggests that coping styles may account for the development of depressive symptoms. Specifically, passive coping and disengagement are related to depressive symptoms and distress, whereas active coping styles and acceptance are typically associated with emotional well-being.[7-11] However, studies that have examined the relationship of coping and well being in HF patients provide mixed results. Carels and colleagues found that active/acceptance coping was associated with fewer depressive symptoms, but did not find an association between disengagement and depression.[12] Similarly, Vollman et al. (2007) found that HF patients who used more avoidance and less active coping styles had more depressive symptoms to demonstrate depression in their cross-sectional studies.[13] Other studies have shown the opposite in that avoidance coping and disengagement, but not active coping, are associated with more depressive symptoms.[14, 15] Further examination of this relationship in HF patients is indicated to clarify these contradictions.

Another factor that may be associated with depressive symptoms is social support. Low social support is an independent risk factor for morbidity and mortality in healthy populations[16] as well as in patients with established cardiovascular disease.[16, 17] In patients with HF, a small number of investigations suggest that depressive symptoms may be impacted by both the presence and nature of social support. Specifically, the presence of social support has been associated with lower incidence of depression and faster remission of depressive symptoms, [18, 19] whereas lack of social support and conflictual relationships have been linked to the presence of depression.[20, 21]

The strongest evidence for social support emerges from a study by Scherer and colleagues, who examined the development of distress in 291 HF outpatients over a 9-month period.[21] They measured coping style, social support, social context, employment, and disease severity at baseline, and distress at both baseline and 9-month follow-up. One hundred and eighty patients reported low distress at both baseline and follow-up as measured by the Hospital Anxiety and Depression Scale. Patients with low distress were more likely to live with a partner. In subsequent analyses of the full sample, high social support emerged as the sole protective factor in resolving distress and maintaining low distress at follow-up.

Although these results appear consistent, several limitations exist within this body of research. In addition to a paucity of studies in this area, existing studies are lacking in rigor, and often based on small samples that limit the generalizability of their findings. In addition, observations are frequently made in HF inpatients, where depressive symptoms may be confounded by disease exacerbation and/or hospitalization itself.[22] These depressive symptoms may be reactionary and diminish once adequate disease control is achieved and the patient is

discharged. However, depressive symptoms also may be chronically present in stable outpatients where they may be impacted by the presence of social support. Therefore, it remains imperative to continue to examine the impact of social support on depressive symptoms in patients with stable HF.

A coping style that has been receiving increasing attention in patients with heart disease is optimism. Dispositional optimism is a relatively stable personality trait predisposing individuals to an expectancy of positive outcomes.[23] Because behavior is often determined by outcome expectancies, [24] optimists may be more likely to attempt to overcome their adversity through active coping.[8] In patients with chronic illness, higher optimism has been linked to better survival and adaptation.[25] Specifically, coronary heart disease patients with higher optimism appear to be at lower risk for depression[26] and demonstrate better clinical outcomes. [24, 27] Despite these findings, no published study to date has examined the association of optimism with depressive symptoms in HF patients. The exact relationship between optimism and depression demands closer examination in HF patients, especially because optimism and depression may have been found to have independent effects on clinical outcomes.[28]

The purpose of this investigation was to evaluate the association of coping styles with depressive symptoms in a sample of stable HF outpatients. We hypothesized that patients with more depressive symptoms would report more avoidance coping, less active coping, less optimism, and lower perceived social support.

Methods

Two hundred and twenty-nine HF patients were recruited for an ongoing, prospective study examining psychophysiological factors impacting mortality and hospitalizations in stable HF patients.[4] Patients were recruited from the HF clinics of Duke University Medical Center and University of North Carolina (UNC) Health Care System from January, 2000 to December, 2002. Patients were included if they had a left ventricular ejection fraction (LVEF) of <40% and had a stable New York Heart Association Class I-IV for at least 3 months. Patients were excluded if they had uncontrolled hypertension or had had an MI or revascularization procedure within 3 months of study enrollment. Because one of the outcome measures included heart rate variability, patients were excluded if they were pacemaker-*dependent*; however, the presence of a pacemaker was not sufficient to exclude patients from participating. All methods were approved by the IRB at Duke University Medical Center and written informed consent was obtained from all participants prior to their participation. Data reported here represent cross-sectional analyses of baseline data, in which participants completed a battery of self-report psychosocial questionnaires.

Psychometric Test Battery

In addition to demographic measures, participants were administered a battery of questionnaires to assess depressive symptoms, optimism, coping styles, and social support at baseline. The questionnaires are as follows:

1. Depressive Symptoms—The Beck Depression Inventory (BDI) was used to measure depressive symptoms.[29] The BDI is a 21-item paper and pencil self-report questionnaire designed to measure severity of depressive symptoms. Severity of different depressive symptoms (e.g., fatigue, sadness, feelings of worthlessness) is rated by choosing one statement out of four that best describes the responders' cognitive or somatic experience in the previous 2 weeks. Total scores range from 0-63, where higher score indicates presence of more depressive symptoms. This measure was selected for two reasons: Because it is widely used in the cardiac literature and because the presence of subclinical depressive symptoms has documented prognostic significance in cardiac populations.[30] Several studies have

demonstrated high internal consistency (mean alpha coefficient=.87), as well as adequate concurrent validity with other self-report measures of depression (mean alpha coefficient=. 60), and adequate test-retest reliability (mean alpha coefficient=.60).[29]

2. Dispositional Optimism—Dispositional optimism was measured using a revised version of the Life Orientation Test (LOT-R).[31, 32] Unlike the BDI, the LOT is designed to assess dispositional optimism—a more positive set of cognitive and emotional responses. The LOT-R is an 8-item measure in which items are rated on a Likert-type format ranging from “I agree a lot” to “I disagree a lot.” Scores range from 0 to 32, with lower scores indicating higher dispositional optimism. Representative items include “When things are uncertain in life, I usually expect the best” and “I'm a believer in the fact that when bad things happen, something good will come out of it.” The scale has adequate test-retest reliability (alpha coefficient=.79) and internal reliability (alpha coefficient=.76). The scale used in this study has been modified to include 2 face valid items assessing optimism. Therefore, scores ranged from 0 to 40 for the measure used in this study.

3. Coping Styles—Coping styles were measured using the COPE, [33] a 60-item self-report measure that examines 15 styles of coping: acceptance, active coping, alcohol and drug disengagement, behavioral disengagement, denial, humor, positive reinterpretation and growth, mental disengagement, planning, turning to religion, restraint coping, seeking emotional support, seeking instrumental support, suppression of competing activities, and venting of emotions. Items ask the respondent to rate the frequency with which they engage in different coping behaviors, scored on a 4-point scale ranging from “I usually don't do this at all” to “I usually do this a lot”. Scores are obtained by summing up items within each subscale, ranging from 4 to 16. Each coping style forms a subscale with a test-retest reliability of .60 or greater, with the exception of mental disengagement (alpha=.45).

4. Social Support—Social support was measured using the ENRICHD Social Support Inventory (ESSI)[34] and the Perceived Social Support Scale (PSSS).[35] The two measures were used for their ability to measure different aspects of social support: whereas the 12-item PSSS assessed perceived emotional support, the 7-item ESSI measured emotional, structural and instrumental support.

The PSSS is a self-report measure designed to assess perceived emotional support from friends, family and significant others. Responders indicate their degree of agreement with the items on a 7-point Likert type format ranging from “very strongly disagree” to “very strongly agree.” Representative items include “There is a special person who is around when I am in need” “My friends really try to help me” “I get the emotional help and support I need from my family.” Items are summed to obtain scores between 12 and 84, with higher scores indicating greater support. The scale has adequate test retest reliability (alpha coefficient=.85) and internal reliability (alpha coefficient=.88)

The ESSI is a self-report measure comprising of 7 items. Two items each measure structural, instrumental and emotional support, scored on a 5-point scale ranging from “none of the time” to “all of the time”. Representative item includes “Is there someone available to you whom you can count on to listen to you when you need to talk?” and “Is there someone available to help you with daily chores?” The seventh item is a “yes/no” item asking whether the respondent lives with their spouse. Summary scores range between 8 and 34, and the internal consistency of the ESSI is .86.

Disease Severity

Disease severity was measured using N-Terminal Pro-B-Type Natriuretic Peptide (NT-proBNP), a derivative of brain natriuretic peptide that is now being used as a diagnostic and prognostic marker of HF.[36-38] In patients with a confirmed diagnosis of CHF, levels of NT-proBNP have been found to positively correlate with NYHA class[39] and left ventricular ejection fraction (LVEF).[40] Unlike NYHA class, however, levels of BNP are not confounded by the presence of pulmonary disease such as chronic obstructive pulmonary disease and pneumonia, diseases without cardiac involvement that may present with dyspnea.[41] LVEF is an objective measure of systolic function but has poor inter- and intrarater reliability.[42] NT-proBNP testing also has been found to be a more reliable approach to HF diagnosis in symptomatic patients whose condition had been previously undiagnosed.[43-45] Our own data also show that NT-proBNP is a strong prognostic indicator of adverse clinical outcomes in HF, including death and hospitalization.[4] Therefore, NT-proBNP is considered to be an excellent marker of HF disease severity by virtue of its specificity. In this study, NT-proBNP was extracted from a blood sample obtained from the antecubital vein following a 20 minute seated relaxation period. Methods of blood collection and processing are described in detail in Sherwood et al. (2007).[4]

Statistical Analyses

We conducted initial descriptive analyses to examine baseline characteristics of our sample. We further described the data by dichotomizing into BDI<10 and BDI≥10. This cutoff point was used because BDI ≥10 has been found to be prognostically important in cardiac populations.[46, 47] T-tests were conducted to examine whether there were differences in age, LVEF and NT-proBNP between the two BDI categories. Similarly, chi-square analyses were conducted to examine whether there were gender, ethnicity, or NYHA Class differences between the two BDI categories.

The overall analytical approach involved conducting regression analyses to examine whether higher scores on the COPE, ESSI, PSSS, and lower scores on the LOT-R, were associated with higher score on the BDI. BDI scores were entered as the outcome variable and COPE, ESSI, PSSS, and LOT-R scores were entered as predictor variables in individual regression models. Two sets of analyses were conducted based on the treatment of BDI scores. In multivariate linear regression analyses, BDI scores were treated as a continuous variable. In multivariate logistical regression analyses, BDI scores were dichotomized into BDI<10 and BDI≥10. This cutoff point was used because BDI ≥10 has been found to be prognostically important in cardiac populations.[47] All analyses were adjusted for age and NT-proBNP levels. COPE, ESSI, PSSS, LOT-R scores, age and NT-proBNP levels were treated as continuous variables in all analyses.

All data analyses were conducted using SAS® 9.1 (SAS, Cary, NC). Significance levels were set at $p<.05$. All analyses were two-tailed.

Results

Sample characteristics are shown in Table I. Sample was racially diverse with a similar number of White and Black patients. The mean BDI score was 10.1 (SD=7.1), which is in the range of mild depressive symptoms. Sample characteristics are further described according to a BDI<10 and BDI≥10 categorization. Results show that the participants in the BDI<10 category were older. No differences were found in gender, ethnicity, LVEF, and NT-proBNP levels between the two categories. Differences in NYHA Class were detected; however, these results may be unstable due to the limited number of patients that were diagnosed with Class I or Class IV HF.

Multivariate linear regression analyses were conducted to examine the association of BDI scores and coping styles. Each 1 point increase in BDI scores was associated with a decrease on the following COPE subscales: acceptance (β=-.14, p<.05), humor (β=-.15, p<.05), planning (β=-.15, p<.05), seeking emotional support (β=-.14, p<.05) and mental disengagement (β=-.22, p<.01). On the other hand, a 1 point increase in BDI scores was associated with an increase on the behavioral disengagement subscale (β=.41, p<.001), denial subscale (β=.33, p<.001), and venting subscale (β=.25, p<.001). Other subscales were not significantly related to BDI scores. The presence of social support was associated with lower scores on the BDI both for ESSI (β=-.25, p<.001) and the PSSS (β=-.32, p<.001). Higher dispositional optimism (as denoted by *lower* scores on the LOT) was associated with lower depressive symptoms (β=.36, p<.001). These results are summarized in Table II.

Multivariate logistic regression analyses were conducted to examine which coping styles were associated with a greater probability of having a BDI score ≥10. Having BDI≥10 was associated with a 30% greater likelihood of using behavioral disengagement or mental disengagement as a coping style (OR=1.3), and a 20% greater likelihood of using denial and venting coping styles (OR=1.2). Having BDI≥10 was associated with an 8% greater likelihood of reporting low perceived social support (OR=.92 for PSSS and ESSI), and a 20% greater likelihood of having low dispositional optimism (OR=1.2). By contrast, the acceptance, humor, planning, and seeking emotional support subscales of COPE did not achieve significance in logistic regression analyses. These results are summarized in Table III.

Discussion

The principal finding from our study was that elevated depressive symptoms were associated with more avoidant coping styles, less optimistic attitudes, and lower levels of perceived support. This was true when depressive symptoms was measured as number of symptoms, as well as when depressive symptoms was measured by dichotomizing chronic illnesses such as cancer and HIV/AIDS populations which show that passive emotional-coping styles are related to poorer outcomes, whereas active coping styles are related to positive morbidity outcomes[48] and lower mortality risk.[49]

Based on our findings, the presence of depression may indicate the presence of coping styles that adversely impact the optimal management of this disease. Avoidant coping such as denial potentially predisposes a patient to ignore medical recommendations, or symptoms that could signify the need for medical attention.[50] On the other hand, adaptive coping may not only help problem-solve strategies for treatment and monitoring increasingly debilitating symptoms,[51-53] it might help in allotting emotional resources to managing illness.[51] Therefore, optimal medical management of HF may require problem-focused coping strategies such as behavioral engagement, and emotion-focused coping such as maintaining an optimistic view of current health. This may suggest coping as a potential pathway through which the presence of depression impacts prognosis in HF.

To our knowledge, this study is the first to examine the association of optimism with depressive symptoms in HF patients. A growing body of evidence supports the notion that optimism has important consequences for heart disease patients. In patients who have undergone coronary artery bypass grafting, optimism may be related to faster recovery[54] and lower rehospitalization rates.[27] Although the mechanisms are unclear, the difference in outcome expectations between optimists and pessimists may provide an explanation: Optimists tend to expect a more favorable outcome, whereas pessimists tend to have negative expectations. Because behavior is often determined by expectations, optimists may be more likely to make efforts to remain engaged in disease management and take preventive action when necessary.[55, 56] Intuitively, it might seem as though pessimism is antithetical to optimism, and integral to depression. However,

within the context of health outcomes, optimism and pessimism appear to be separate constructs, rather than opposite ends of the same spectrum.[55] Therefore, higher optimism may have an independent impact on health outcomes than lower pessimism, including the outcome of depressive symptoms.[57] Focused research on the impact of optimism on depressive symptoms is needed to replicate our results as well as to identify underlying mechanisms.

Patients with coronary heart disease have been shown to gain health benefits from the presence of social support,[58-60] although the interpretation of this literature may depend on its definition.[16] Our results extend these findings to the HF patient population. In HF patients, emotional support derived through social contact may become critical in offsetting depressed mood, and instrumental support may offset the physical limitations of the disease.[12, 61] However, prospective studies are needed to determine the mechanisms through which social support impacts depressive symptoms and clinical outcomes in HF patients.

Increasing attention is being paid to the importance of positive affect in patients with heart disease. Findings so far have been mixed, with some studies showing that positive affect is linked to longevity.[62] However, the effects of positive affect have been reported to disappear when the impact of depression is examined,[62] suggesting that the impact of depression in heart disease may supersede the impact of many other psychosocial factors. Overall, the impact of positive affect has received very limited attention in HF, and although our current study was not designed to examine the relative impact of positive affect versus depression on outcomes, we believe this is an important area of future research for heart disease in general, and HF in particular.

The key limitation of this study is its cross-sectional design. Because of this, we can neither establish the presence of a causal pathway between depressive symptoms and coping styles, nor can we establish the direction of causation should it exist. It is possible that depressive symptoms may result from poorer coping strategies and low social support,[14] but it is also possible that the latter characteristics emerge from depressive symptoms, or that both depressive symptoms and poor coping styles emerge from a common underlying factor.[63] However, teasing apart the relationship between coping styles and depression has been historically challenging,[13] and our data provide evidence that coping styles and depressive symptoms are related in HF patients. We hope that our findings might provide impetus for future prospective studies examining the link between coping styles and the onset or exacerbation of depressive symptoms.

Our study also does not test whether maladaptive coping has implications for HF related morbidity and mortality, and whether modifying coping styles will alleviate the incidence of depressive symptoms in HF patients. Randomized clinical trials are needed to ascertain the most efficacious intervention in treating depressive symptoms in HF. Interventional studies may expand our understanding as to whether modifying coping styles alleviates depressive symptomatology in HF patients, and whether this change ultimately affects HF-related morbidity and mortality.

Despite these limitations, this study provides insight into the coping styles and strategies that are associated with depressive symptoms in HF patients. Findings related to behavior disengagement, mental disengagement, denial, venting, low perceived social support, and low dispositional optimism appeared particularly robust. Investigations examining the types, sources, and quality of social support will continue to further our understanding of the connection between social support and depressive symptoms. Screening for these coping styles in a primary care setting may help identify patients who have clinically significant depressive symptoms. Results regarding optimism should be treated as hypothesis-generating, given the limited literature in this area. Findings from this study provide impetus for future prospective

studies that will help elucidate causal pathways that may exist between depressive symptoms and coping.

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Table I

Sample Characteristics

Variable	Full Sample	Sample Characteristics by BDI[a]		
		BDI <10	BDI≥10	*p*
N	222	128 (58%)	94 (42%)	--
Male Gender, N	148 (67%)	87 (68%)	61 (65%)	NS
White Race, N	109 (49%)	58 (45%)	51 (54%)	NS
Age, y (Mean ± SD)	57.3 ± 12.5 (Range: 27-88)	59.3 ± 12.3	54.4 ± 12.4	<.01
Left Ventricular Ejection Fraction (LVEF), %	32 ±12	32 ± 12	32 ± 12	NS
NYHA Class, N	Class I=7; Class II=130; Class III=88; Class IV=7	Class I=5; Class II=84; Class III=39; Class IV=0	Class I=2; Class II=42; Class III=47; Class IV=3	<.01[b]
ProBNP, pg/ml (Mean ± SD)	1679 ± 2670	1804 ± 2801	1517 ± 2527	NS
BDI[a] Score (Mean ± SD)	10.1 ± 7.1	5.5 ± 2.7	16.4 ± 6.4	--

[a] BDI=Beck Depression Inventory

[b] These results may not be stable, as the cells with the number of Class I and Class IV patients had N<5

Table II

Results from linear regression analyses where BDI was continuous (adjusted for age and NT-proBNP).

Variable	Model *F*	Standardized β (95% CI)
COPE Subscales		
Acceptance	5.33	-.14* (-.80, -.01)
Active Coping	5.01	-.12 (-.74, .04)
Alcohol and Drug Disengagement	4.40	.08 (-.26, 1.00)
Behavioral Disengagement	18.75	.41*† (.75, 1.41)
Denial	13.10	.33*† (.50, 1.12)
Positive Reinterpretation and Growth	4.53	-.09 (-.62, .12)
Humor	5.68	-.15* (-.64, -.04)
Mental Disengagement	7.71	.22** (.24, .97)
Planning	5.68	-.15* (-.72, -.04)
Turning to Religion	4.27	.07 (-.14, .44)
Restraint Coping	4.10	.05 (-.24, .50)
Seeking Emotional Support	5.46	-.14* (-.60, -.20)
Seeking Instrumental Support	4.22	.06 (-.48, -.17)
Suppress	4.13	.05 (-.24, .55)
Venting	8.64	.25*† (.29, .97)
PSSS[a]	11.82	-.32*† (-.47, -.19)
ESSI [b]	8.38	-.25*† (-.52, -.15)
LOT-R[c]	14.68	.39*† (.47, .99)

[a] PSSS=Perceived Social Support Scale

[b] ESSI=ENRICHD Social Support Inventory

[c] LOT-R=Life Orientation Test-Revised

* $p<.05$,

** $p<.01$,

*† $p<.001$

Table III

Results from logistic regression analyses where BDI was dichotomized into BDI<10 and BDI≥10 (adjusted for age and NT-proBNP)

Variable	Odds Ratios (95% CI)
COPE Subscales	
Acceptance	.92 (.82, 1.04)
Active Coping	.96 (.85, 1.08)
Alcohol and Drug Disengagement	1.3 (.96, 1.64)
Behavioral Disengagement	1.3*† (1.13, 1.44)
Denial	1.2** (1.07, 1.31)
Positive Reinterpretation and Growth	.96 (.86, 1.08)
Humor	.93 (.85, 1.02)
Mental Disengagement	1.3*† (1.11, 1.40)
Planning	.95 (.85, 1.05)
Turning to Religion	1.03 (.95, 1.13)
Restraint Coping	1.09 (.98, 1.22)
Seeking Emotional Support	.92 (.85, 1.0)
Seeking Instrumental Support	.96 (.87, 1.06)
Suppress	1.1 (.95, 1.2)
Venting	1.2** (1.03, 1.3)
PSSS[a]	.92*† (.88, .97
ESSI [b]	.92** (.87, .98)
LOT-R[c]	1.2*† (1.13, 1.37)

[a] PSSS=Perceived Social Support Scale

[b] ESSI=ENRICHD Social Support Inventory

[c] LOT-R=Life Orientation Test-Revised

* $p<.05$,

** $p<.01$,

*† $p<.001$