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Spiritual Well-Being, Depressive Symptoms, and Immune Status Among Women Living with HIV/AIDS

Safiya George Dalmida, PhD, RN [Assistant Professor],

Emory University Nell Hodgson Woodruff School of Nursing Atlanta, GA 30322 (404) 712-8449
sageorg@emory.edu

Marcia McDonnell Holstad, DSN, RN [Assistant Professor],

Emory University Nell Hodgson Woodruff School of Nursing Atlanta, GA 30322

Colleen Dilorio, PhD, RN [Professor], and

Emory University Rollins School of Public Health Atlanta, GA 30322

Gary Laderman, PhD [Professor and Chair]

Emory University Rollins School of Public Health Atlanta, GA 30322

Abstract

Spirituality is a resource some HIV-positive women use to cope with HIV, and it also may have positive impact on physical health. This cross-sectional study examined associations of spiritual well-being (SWB), with depressive symptoms, and CD4 cell count and percentages among a non-random sample of 129 predominantly African-American (AA) HIV-positive women. Significant inverse associations were observed between depressive symptoms and SWB ($r = -.55$, $p = .0001$), and its components, existential well-being (EWB) ($r = -.62$, $p = .0001$) and religious well-being (RWB) ($r = -.36$, $p = .0001$). Significant positive associations were observed between EWB and CD4 cell count ($r = .19$, $p < .05$) and also between SWB ($r = .24$, $p < .05$), RWB ($r = .21$, $p < .05$), and EWB ($r = .22$, $p < .05$) and CD4 cell percentages. In this sample of HIV-positive women SWB, EWB, and RWB accounted for a significant amount of variance in depressive symptoms and CD4 cell percentages, above and beyond that explained by demographic variables, HIV medication adherence, and HIV viral load (log). Depressive symptoms were not significantly associated with CD4 cell counts or percentages. A significant relationship was observed between spiritual/religious practices (prayer/meditation and reading spiritual/religious material) and depressive symptoms. Further research is needed to examine relationships between spirituality, mental and physical health among HIV-positive women.

Keywords

HIV; spirituality; depressive symptoms; CD4 cell count

Introduction

The process of “humanizing” health care involves the consideration of individuals’ unique psychosocial resources, including their spirituality, during illness and recovery. Spirituality encompasses feelings of connection to others and finding meaning in life (Barnum, 1996; Como, 2007; Friedmann, Mouch, & Racey, 2002; O’Brien, 2003; Sessanna, Finnell, & Jezewski, 2007; Simoni, Martone, & Kerwin, 2002). Spirituality has been associated with positive health outcomes for individuals (Hill, 2005; Hill & Pargament, 2003; Koenig, McCullough, & Larson, 2001; Miller & Thoresen, 2003; Oman & Thoresen, 2005), including an improved perception of health status (Phillips, Mock, Bopp, Dudgeon, & Hand,

2006), especially among women who are experiencing challenges to their health and well-being (Musgrave, Allen, & Allen, 2002). A large majority (85%) of patients in the United States who are infected with the human immunodeficiency virus (HIV) affirm the importance of spirituality in their lives and in dealing with family, work-related, or personal issues (Lorenz et al., 2005).

In recent years, the rate of HIV incidence among women has increased exponentially, particularly among women in large inner cities (CDC, 2005) and black women (CDC, 2008), and by the end of 2005, an estimated 181,802 cumulative cases of Acquired Immunodeficiency Syndrome (AIDS) had occurred in women in the United States (CDC, 2008). HIV remains among the leading causes of death for women in the U.S. between 25 and 44 years of age and is the leading cause of death for black women aged 25–34 years (CDC, 2008). For many HIV-positive women, spirituality is an important resource used to cope with the stressors and demands associated with HIV disease (Bosworth, 2006; McCormick, Holder, Wetsel, & Cawthon, 2001; Powell, Shahabi, & Thoresen, 2003; Sowell et al., 2000). Spirituality might complement the help received from mental health counseling, support groups, and family and friends (Dalmida, 2006). It is therefore, important to assess the extent to which spirituality plays a role in the lives of the growing number of HIV-positive women. It is also imperative to explore the possible connections between clients' spiritual beliefs and practices and selected health outcomes (Como, 2007; Dossey & Dossey, 1998; King, 2006). The present study examines the relationships between spiritual well-being (SWB), mental health, and immune status among women with HIV.

Spirituality and Health

Overall, people with HIV/AIDS identify spirituality as an important factor in health and well-being (Fryback & Reinhart, 1999; Lorenz et al., 2005). Spirituality provides practical, supportive resources that facilitate coping, psychological adaptation (Kelly, 2004; Lorenz et al., 2005; Simoni et al., 2002; Sowell et al., 2000), influence health practices and behavior (Rabin, 1999; Miller & Thoresen, 2003) and promote quality of life for women with HIV/AIDS (Sowell et al., 2000). Spirituality has been considered as an individual resource for dealing with illness (Kelly, 2004) and adjusting to uncertainties associated with chronic illness (Landis, 1996), especially when usual coping mechanisms are ineffective (Simoni et al., 2002).

Spirituality is closely related to the physiologic or psychosocial health of a person (Ellison, 1983; Relf, 1997). Spirituality may keep the brain-psyche-body connection in balance, especially during stressful times, by facilitating more adaptive coping styles and positive emotions (Koenig & Cohen, 2002). Mueller and colleagues (2001), in a comprehensive review of the literature, found that most studies showed an association between spirituality and better health outcomes, including, greater coping skills, and less depression. Study findings about the connections between religion/ spirituality and mental or physical health are often stronger in patients with severe or chronic illnesses (i.e. HIV) who are experiencing stressful psychological or social changes and/or existential struggles related to meaning or purpose in life (Koenig, 2004).

Spirituality and Mental Health

Researchers have studied the relationship between spirituality and various psychological factors, but few have examined the relationship between spirituality and depression among persons with HIV/AIDS (Braxton, Lang, Sales, Wingood, & DiClemente, 2007; Coleman & Holzemer, 1999; Nannis, Patterson, & Semple, 1997; Nelson, Rosenfeld, Breitbart, & Galietta, 2002; Pace & Stables, 1997; Simoni et al., 2002; Simoni & Ortiz, 2003; Somlai, Heckman, Hackl, Morgan, & Welsh, 1996; Yi et al., 2004). Of these, only three studies were

conducted among women (Braxton et al., 2007; Simoni et al., 2002; Simoni & Ortiz, 2003). Research examining the patterns of spirituality in women and men with HIV has suggested that spirituality may help to shape mental perceptions and interpretations (Hall, 1998). Studies among persons with HIV and the terminally ill have shown significant inverse relationships between spirituality and depression, independent of or more than religious factors (Coleman & Holzemer, 1999; Nelson et al., 2002; Simoni & Ortiz, 2003).

Positive associations between existential well-being (EWB) and appraisal-focused coping ($r=0.44$, $p=.001$) and inverse associations between EWB and stress ($r=-0.36$, $p=0.001$), psychological distress ($r=-0.36$, $p=.001$), and emotional coping ($r=-.043$, $p=.009$) have been identified among persons with HIV (Tuck, McCain, & Elswick, 2001). Yi and colleagues (2004) noted that a majority of a sample of men and women with HIV/AIDS reported significant depressive symptoms, and poorer SWB was related to significant depressive symptomatology. Similarly, in a more recent study, mental health status was significantly positively correlated with spiritual well-being ($r=0.27$, $p=0.0082$) and existential well-being ($r=0.31$, $p=0.0027$) among HIV-infected men and women (Phillips et al., 2006). Somlai et al. (1996) reported a strong positive association for spiritual dimensions with mental health, psychological adjustment, and coping among persons with HIV/AIDS.

Very little research has specifically examined the relationship between spirituality and mental health among HIV-positive women (Braxton et al., 2007; Simoni et al., 2002; Simoni & Ortiz, 2003), and among them only few have examined an association with depressive symptoms. Researchers found that spiritually-based coping or spiritual activities provided beneficial effects for depressive symptoms, mood states, self-esteem (Simoni et al., 2002), and emotional distress among women with HIV/AIDS (Sowell et al., 2000). Simoni and Ortiz (2003) found a significant inverse association between spirituality and depressive symptoms among 142 Puerto Rican women with HIV/AIDS. Braxton et al. (2007) identified a significant inverse association between spirituality and depressive symptoms among 308 HIV-positive Black women and found that spirituality explained a significant amount of the variance in reducing symptoms of depression.

Mental Health and Immune Status

Several studies, particularly those embedded in a Psychoneuroimmunology (PNI) framework, have contributed to the understanding of the role of psychological factors in physical illness (Cohen and Herbert, 1996) and immune function. Cohen and Herbert (1996) reviewed several studies and found a negative correlation between depression and CD4 cell counts. Researchers have demonstrated that depression is associated with alterations in immune function, specifically decreased CD4 cell count (Ickovics et al., 2001) and CD8 T cells among persons with HIV (Evans et al., 2002). Yi and colleagues (2006) in bivariate analyses of 450 men and women with HIV found that individuals with significant depressive symptoms had significantly lower CD4 cell counts and significantly higher HIV viral load than those with no significant depressive symptoms (Yi et al., 2006). Similarly, Ickovics and colleagues (2001) found that depressive symptoms were associated with HIV disease progression, as measured by decline in CD4 cell count among women with HIV.

Spirituality and Immune Status

Several positive linkages between spirituality or religiosity and immune function have been identified (Koenig et al., 1997; Ironson et al., 2002; Sephton, Koopman, Schaal, Thoresen, & Spiegel, 2001; Woods, Antoni, Ironson, & Kling, 1999). In a population of HIV-positive men and women, spiritual or religious behavior, such as prayer and attendance at services, was associated with higher CD4 cell counts and percentages (Woods et al., 1999). Despite these findings, few studies have examined this relationship among women living with HIV.

Many of the studies that have found associations between greater spiritual components and better CD4 counts have been among women with metastatic breast cancer (Sephton et al., 2001), older adults (Koenig et al., 1997), HIV-positive gay men (Bower, Kemeny, Taylor, & Fahey, 1998), and mixed groups of HIV-positive men and women (Ironson, Stuetzle, & Fletcher, 2006; Woods et al., 1999). In a longitudinal study, Ironson et al. (2006) found that those who reported an increase in spirituality had significantly better maintenance of CD4 cells and significantly better control of the HIV virus over four years.

The purpose of the present study was to examine interrelationships among SWB, depressive symptoms, and immune status. Because researchers have identified a relationship between spirituality and psychological variables such as anxiety and depression, we examined further the association between spirituality and physical health with three hypotheses: 1) higher total SWB scores and subscores for EWB and religious well-being (RWB) would be associated with lower depressive symptom scores ; 2) higher depressive symptom scores would be associated with lower CD4 cell counts and percentages and 3) higher SWB scores and subscores would be associated with higher CD4 cell counts and percentages, indicating better immune function.

Methods

Design and Setting

A descriptive cross-sectional, secondary analysis of data from two similar, NIH-funded studies, The Get Busy Living (GBL) Study (NR01 NR04857) and the KHARMA (Keeping Healthy and Active with Medication and risk reduction Adherence) Project (R01 NR008094-01-A1), was conducted to examine the relationships of SWB, with depressive symptoms, and immune status in women living with HIV. Approval to conduct the secondary analysis of data from both studies was received from Emory University's Institutional Review Board (IRB) on November 18, 2005, and informed consent was initially obtained from all study participants.

The Get Busy Living HIV treatment adherence study was designed to determine if a nurse counseling intervention, based on motivational interviewing (MI) techniques, enhanced adherence among men and women with HIV who were taking antiretroviral medications (DiIorio et al., 2008). The KHARMA Project behavioral intervention trial was designed to test the effects of a group motivational intervention on adherence to antiretroviral medications and risk reduction behaviors among women with HIV (Holstad, DiIorio, & Magowe, 2006). Both studies were conducted at a primary clinical center for infectious diseases (ID) in a metropolitan area in the southeast. The KHARMA project also recruited HIV-positive women from four additional ID clinics in the same city. Eligibility for care at the primary ID clinic included CD4 counts less than 200 cells/ μ l and being a woman who had a child at the pediatric clinic of the ID clinical center. In 2004, 77.5% of the 4767 active case managed clients were African-American, and 33% were women.

Participants for GBL were recruited through nurse educators at the clinic(s), and the target population consisted of individuals who were either: 1) prescribed antiretroviral therapy (ART) for the first time; 2) had a change in ART regimen or 3) referred to the nurse educator for adherence education. Individuals who met initial eligibility criteria, as determined by nurse educators at the clinic, (18 years or older, HIV positive, and met either of the previous criteria to see a nurse educator) and who were interested in speaking with a study recruiter were referred (DiIorio et al., 2008). For each eligible individual, nurse educators completed and signed a short referral checklist that included the person's name and initial eligibility status. For the KHARMA project, women were also self-referred or recruited by their healthcare providers and nurse educators. All women needed a signed

referral prior to screening. Referred individuals called the study recruiter or visited the study office at the clinic to schedule a face to face screening interview at the clinic. The study recruiter(s) described the study to referred individuals and interested persons signed informed consents and completed a screening interview.

For both studies, eligibility criteria was assessed by the study staff during a face to face screening interview at the clinic (in the study office) and included: being infected with HIV, prescribed a new or different antiretroviral medication regimen or self-identification as non-adherent, able to speak and understand English, being 18 years or older, mentally stable as determined by screening assessment, willing to participate by completing computerized questionnaires and use Medication Event Monitoring System (MEMS®) caps. The KHARMA Project also required women to be female by birth and prescribed antiretroviral medications (could include a new or changed regimen). For KHARMA, potential participants handed in their referral forms at the screening visit and also completed an assessment for cognitive impairment and severe depressive symptoms and suicidal tendencies. Participants with severe cognitive impairment were not eligible. Those with severe depressive symptoms and/or suicidal ideations were immediately referred to mental health services and were able to be rescreened after receiving mental health care, usually in 2-3 weeks. A total of 249 women were screened for the KHARMA Project, 207 (83%) of whom were eligible and completed baseline interviews. Of the 282 men and women screened for eligibility for the GBL study, 272 (96.5%) were eligible, and 247 (87.6%) participated in the study (DiIorio et al., 2008). Thirty-three percent (n=79) of the GBL study sample were women. Participants were asked to complete a confidential baseline assessment and three follow-up assessments as part of the Get Busy Living Study and four follow-up assessments for the KHARMA Project. Data collection was conducted between 2001 and 2005 for the GBL study and between 2005 and 2008 for the KHARMA Project. Data for both studies were collected via an Audio-Computer Assisted Self-Interview (ACASI) program. To be included in the present study, participants had to meet eligibility criteria of the original studies and be female by birth.

Measures

Measures used included basic demographics, SWB, depressive symptoms, CD4 cell count and percentages, and HIV medication adherence (control measure). Unless otherwise indicated, scale items were rated on a Likert-type format and individual items were summed to form a total score for each scale.

Spiritual well-being—SWB was measured using the Spiritual Well-Being scale (Ellison, 1983; Paloutzian & Ellison, 1982), which has 20 items and is comprised of subscales that measure SWB in two dimensions: EWB and RWB. The SWB scale assesses both religious and more existential aspects of spirituality (Tsuang, Simpson, Koenen, Kremen, & Lyons 2007). The ten odd-numbered items represent the RWB subscale and measure the degree to which a person perceives her SWB expressed in relation to God. The ten even-numbered items represent the EWB subscale and measure the degree to which a person is adjusted to self, community, surroundings, and life overall and can identify meaning and purpose in their life. The total SWB score ranges from 20 to 120, respectively representing lower and higher SWB. Scores on the EWB and RWB subscales range from 10 to 60 each, representing low to high EWB or RWB, respectively. Based on original testing, test-retest reliability of the SWB scale is greater than .85 (SWB= .93, RWB= .96, EWB= .86). The Cronbach's alphas ranged from .80-.90 for this study.

Depressive symptoms—Depressive symptoms were measured using the Center for Epidemiological Studies Depression scale (CES-D), which has 20 items and assesses

symptoms of depression over the previous 7 days (Radloff & Locke, 1986). The total score ranges from 0 to 60. A score of ≥ 16 on the CES-D indicates probable major depressive symptoms (Radloff, 1977). The Cronbach's alpha were .88 (GBL) and .89 (KHARMA) in this study.

CD4 T cell—CD4 cell counts and percentages were assessed from electronic medical record laboratory database reviews. The clinical center laboratory used the BD FACSCalibur Flow Cytometer, a technically validated method (BD Biosciences, 2002), to measure CD4 cell count and percentages. For both studies, the median time between lab date and baseline interview was about 27 days and specifically, CD4 lab data were, on average, collected within two-and-a-half weeks of the baseline interview. CD4 levels were reported as absolute number of CD4 T lymphocytes and CD4 lymphocyte percentages per cubic millimeter of peripheral blood. CD4 cell percentage is more stable than the number of CD4 cells (Cotran, Kumar, & Collins, 1999). The clinical center's normal reference range is 468-1599 cells/ml for CD4 cell count and 31-57% for CD4 cell percentages.

HIV medication adherence—The Antiretroviral General Adherence Survey (AGAS; Holstad, Pace, De, & Ura, 2006) was used to measure the control variable. The AGAS is comprised of 5 items that focus on the ease and ability of taking HIV medications as prescribed. Cronbach's alphas for this study were .75 (GBL) and .84 (KHARMA).

Data Analysis

Baseline data on women from both studies were combined into one database, and statistical analyses were conducted using SPSS 13.0 statistical software package. Combination of the databases maximized sample size and provided use of existing data to answer the research questions. Based on statistical power analysis using NCSS-PASS, a sample size of 125 was sufficient to achieve 99% power to test the hypotheses with a two-sided $\alpha=.05$ significance level with effect size $r = 0.15$ (measure of standardized effect). Only baseline (pre-intervention) data were used.

Descriptive statistics, including means, standard deviations, frequencies, and cross-tabulations were calculated to describe the sample. Two-tailed independent sample *t*-tests were used to examine the differences in mean scores of study variables between women from the GBL study and women from the KHARMA project and between women with high and low depressive symptoms. Pearson's correlation was used to assess the relation of SWB to depressive symptoms, and CD4 cell count and percentage. Potential confounders were identified as those significantly related to the dependent variable at $p \leq .05$ in bivariate analyses and theoretically linked to the dependent variable. Hierarchical multiple linear regression analyses were then conducted to examine whether SWB scores and subscale scores were associated with outcome variables, depressive symptoms, CD4 cell count, and CD4 percentages, while controlling for demographic and other factors also related to each outcome. No interactions were tested. Diagnostics were examined for distribution of residuals and for multicollinearity. Residuals were normally distributed, and no multicollinearity was found. Additionally, chi-square tests were performed to examine associations with spiritual/religious activities and depressive symptoms. The depressive symptom status variable was recoded into two categories: high depressive symptoms (CES-D ≥ 16) and low depressive symptoms (CES-D < 16). Prayer/meditation was coded as 1=never, 2=monthly, 3=weekly, 4=daily, reading spiritual material coded as 1=never, 2=monthly, 3=weekly, 4=daily, religious attendance was coded as 1=never/rarely, 2=monthly, weekly, or daily. A chi-square statistic with a significance level $< .05$ was considered significant.

Results

Sample

A total of 129 HIV-positive women were included in the analysis. Sample characteristics are presented in Table 1. The final sample included 72 of the women from the GBL study (N=247) and the first 57 women from the KHARMA Project (N=207) that were recruited by the analysis time in January 2006. For the GBL project, a non-random sample of 247 participants were recruited. Of the 247, 79 were women, 90% of whom were African-American. Initially, 79 of the women from the GBL study were eligible for inclusion in the analysis, but 7 of the women also participated in the KHARMA project and were excluded. The Levene's test showed that groups had approximately equal variances on the dependent variable. No significant mean group differences were observed in SWB, EWB, RWB, depressive symptoms, or CD4 count between women in the GBL project and women in the KHARMA project or between women who met inclusion criteria and those who did not.

The mean age for the sample was 42 (SD 8.27) years. The mean CD4 cell count and percentage for the sample was 291 (SD 222.03) cells/ μ L and 16.24 (SD 9.42) cells/ μ L respectively. The mean HIV viral load was 18,100 copies/ml (SD 67,160). The mean difference between CD4 cell lab collection and baseline assessment was 18.28 (17.97). This sample had a mean depressive symptom score which was slightly above the cut score of 16 on the CES-D scale (Radloff, 1977) (Table 1). The majority of the women in the sample were African-American. More than half of the sample had obtained a high school diploma or a GED, and about one fourth completed some college or technical school, or graduate or professional school. Only a small percentage of the sample was married. The majority of the women were unmarried or were either separated, divorced or widowed. The majority of the sample was unemployed.

Spirituality

Less than half of the sample never or rarely attended religious services. Slightly more than one-third of the sample attended approximately once a week or more. More than half of the sample reported that they prayed or meditated daily or almost every day. Approximately one-third of the sample reported that they read religious or spiritual materials daily or almost daily. Only a very small portion reported that they never prayed or meditated or reported that they never read religious or spiritual materials. Despite variation in spiritual and religious practices found, majority of the sample reported that their religious or spiritual beliefs were "quite important" or "very important" to them. Only few reported that religious or spiritual beliefs were "not at all important" to them. Responses indicated that participants rated themselves as having high spiritual well-being. The sample mean SWB scores and subscale scores indicated moderate to high spiritual well-being.

Associations between Spiritual Well-Being, Depression and Immune Status

Pearson's correlation was used to examine the relationships among spiritual well-being (SWB) and its components, depressive symptoms (CES-D), and immune status (CD4) and to test the study's first three hypotheses. Bivariate correlation analyses indicated that women with higher HIV medication, SWB, RWB, and EWB scores had lower depressive symptom scores (Table 2). Those with higher education (high school/GED or greater) and HIV viral load had lower CD4 cell counts and percentages.

The first hypothesis, of an inverse relationship between SWB and its components (EWB and RWB) and depressive symptoms (CES-D) was supported. These results showed that higher total SWB, RWB, and EWB scores were significantly associated with lower depressive symptom scores. The second hypothesis, of a positive relationship between SWB (and its

components), and immune status (CD4 count/percentage), was partially supported. EWB was the only statistically significant correlate of CD4 cell count. The correlation between EWB and CD4 count ($r=.19$, $p<.05$) represented a weak, but significant, positive correlation. These results indicated that higher scores on the EWB component of SWB were associated with higher CD4 cell counts, representing better immune status. Significant positive associations were also observed between SWB ($r=.24$, $p<.05$), RWB ($r=.21$, $p<.05$), and EWB ($r=.22$, $p<.05$) and CD4 cell percentages. These results indicated that higher scores on all SWB components were associated with higher CD4 cell percentages, which is a more stable measure of immune status than CD4 count. The third hypothesis, of an inverse relationship between depression (CES-D) and CD4 count and percentage was not supported. Results indicated a weak, statistically non-significant negative correlation between depression and CD4 measures.

To examine these relationships more closely, hierarchical linear regression analyses were conducted. In the first step of the hierarchical regression model, demographic variables which were theoretically or statistically associated with depressive symptoms were entered (age, education, employment status, and marital status). The second step of the regression model included potential confounders, such as HIV medication adherence and the log of HIV viral load. The last step of the regression included SWB score to determine the additional amount of variance associated with depressive symptoms beyond that accounted for by the variables in the previous steps. Two additional regressions were employed using the first two steps, and EWB and RWB scores were substituted in step 3 for the second and third regressions, respectively. Each of the three overall models including all three steps were statistically significant (SWB: $F=9.68$, $p=.0001$; EWB: $F=13.01$, $p=.0001$; RWB: $F=4.40$, $p=.0001$) and based on model fit statistics (R^2 , Adjusted R^2 , F , and F Change) each 3-step model provided the best fit for the data. The addition of SWB, EWB, or RWB at the final step in separate regression models accounted for significant increase in variance explained (Table 3).

Additional regression analyses were conducted to explore the association between SWB scores and subscale scores and CD4 cell counts and percentages above and beyond demographic variables and potential confounders, including HIV medication adherence and HIV viral load (log) (Table 3). Separate regressions were employed for CD4 cell count as the outcome variable and then for CD4 cell percentages as the dependent variable. The first and second steps of the regression analyses were identical to the previous steps. The last step in the regression included SWB scores to determine the additional significant amount of variance associated with CD4 cell counts or percentages beyond that explained by the variables in the previous steps. Although the overall models containing all three steps were statistically significant, SWB, EWB, and RWB scores were not significantly associated with CD4 cell count and did not provide any significant additional variance in association with CD4 cell count beyond that accounted for by the variables entered in the previous steps. The overall models for CD4 cell percentages including all three steps were statistically significant (SWB: $F=2.66$, $p=.015$; EWB: $F=2.18$, $p=.044$; RWB: $F=2.89$, $p=.009$) and based on model fit statistics each 3-step model provided the best fit for the data. The addition of SWB scores at the final step in the models accounted for a significant amount of additional variance explained by the model (Table 3).

Overall, the results indicated that in this sample of predominantly African-American HIV-positive women SWB, EWB, and RWB accounted for a significant amount of variance in depressive symptoms and CD4 cell percentages, above and beyond that explained by demographic variables, HIV medication adherence, and HIV viral load (log). The total variance in depressive symptoms accounted for by the full model with SWB was 39.4% with SWB accounting for 31.1% specific variance, the model with EWB was 46.7% with EWB

accounting for 38.4% specific variance, and the model with RWB was 22.8% with RWB accounting for 14.5% specific variance. In this sample, lower SWB, EWB, and RWB scores were significantly associated with higher depressive symptoms (β tas = -.416, -.772, and -.575, respectively). The total variance in CD4 cell percentage accounted for by the full model with SWB was 17.1% with SWB accounting for 6.6% specific variance, the full model with EWB was 14.5% with EWB accounting for 4% specific variance, and the full model with RWB was 18.3% with RWB accounting for 7.8% specific variance. In this sample higher SWB, EWB, and RWB scores were significantly associated with CD4 cell percentages (β tas = .156, .204, and .343, respectively).

Mean Comparisons of SWB Scores Between Women with High Versus Low Depressive Symptoms Independent samples *t*-tests were also conducted to compare mean spiritual well-being scores and subscale scores among women with high depressive symptom scores and women with low depressive symptom scores. For these analyses, dummy-coded variables for depressive symptoms were created. A woman was considered to have high depressive symptoms only if her CES-D score was 16 or higher. Significant mean differences were observed in SWB, RWB, and EWB scores between women with and without high depressive symptoms (Table 4). Women with high depressive symptoms had significantly lower mean SWB scores and subscale scores.

Spiritual/Religious Practices and Depression

Additional analyses were conducted to examine further the association between spirituality/religiosity and depressive symptoms by exploring associations with private (religious attendance) and public spiritual and religious practices (i.e. prayer or reading spiritual/religious material). No significant association was observed between religious attendance and depressive symptom status ($\chi^2=2.76$ $p=.251$) (Table 5). A significant positive association between depressive symptoms and prayer/meditation ($\chi^2=8.10$ $p=.04$) was observed. Two of the three women (68%) who reported “never” or “rarely” engaging in prayer or meditation, had high depressive symptoms (CES-D ≥ 16). Of the 91 women who reported that they prayed or meditated “daily” or “almost everyday”, only 36% ($n=33$) had high depressive symptoms. Depressive symptoms were also significantly associated with frequency of reading spiritual or religious material ($\chi^2=9.71$ $p=.021$). Of the women who reported that they read spiritual or religious material “daily” or “almost everyday” ($n=91$), only 27% ($n=12$) had high depressive symptoms. Of the 7 women who reported that they “never” or “rarely” read spiritual or religious material, 71% ($n=5$) had high depressive symptoms.

Discussion

This study examined associations between spirituality, depressive symptoms, and immune status among predominantly African-American women living with HIV in the Southeastern U.S. On average, the sample was highly spiritual, and spirituality was considered “moderately”, “quite”, or “very” important to a large proportion (86.8%) of the sample. Similarly, Lorenz and colleagues (2005) reported that 85% of patients with HIV affirm that spirituality is “somewhat” or “very” important in their lives. A great portion of the sample also engaged in spiritual or religious practices such as prayer, meditation, or reading spiritual or religious material, on a daily to weekly basis. These findings reflected, to some extent, the importance of spirituality and spiritual/religious practices among people living in the “bible belt” region of the U.S. It is important to note, however, that only a smaller portion of the sample regularly attended (at least weekly) religious services. This suggested that for some women with HIV private spiritual/religious practices (i.e. prayer, spiritual/religious reading) may be more relevant and, possibly, more accessible than public practices (i.e. church attendance). Hall (1998) found that due to stigmatization, organized religion

served as a barrier to attaining spirituality among men and women with HIV. Tarakeshwar and colleagues (2006) found that individuals with HIV practiced spirituality in a variety of ways that did not always include organized religion. Similarly, Cotton and colleagues (2006) found that only 23% of patients with HIV/AIDS participated in organized religion once a week or more. Overall, these findings suggest that organized religion may not be as important as other methods of spirituality for some women with HIV. For some of these women, existential aspects of spirituality, such as meaning and purpose in life, may be more relevant.

The finding of poor psychological well-being is congruent with the literature that women with HIV have an increased prevalence of depression (Hackl, Somlai & Kalichman, 1997; Moneyham et al., 2005), and they have significantly higher rates of depression than their counterparts (Evans et al., 2002; Morrison et al., 2002; Valverde et al., 2007; Vyavaharkar et al., 2007). The demands of living with HIV may predispose HIV-positive persons to the development of depression (Ader, Felten & Cohen, 1991). This is why the identification of resources that facilitate coping within this population is so essential.

The sample CD4 cell counts and percentages were low, on average (mean = 291 and 16.24, respectively), but this finding is consistent with HIV patients, in general, and the patient population at the infectious disease clinics from where participants were recruited. The clinic generally serves HIV-positive patients with CD4 cell counts less than 200 cells/ μ l, which is a criterion for a diagnosis of AIDS (CDC, 2004), and it is typical for CD4 cell counts to decline below 500 cells/ μ l as HIV disease progresses (Cotran et al., 1999). A CD4 percentage below 14% indicates serious immune deficiency and is a sign of AIDS in people with HIV (Cotran et al., 1999). This finding suggested that, on average, the sample consists of women with more advanced stages of HIV disease, which also could contribute to more depressive symptoms.

Results indicated that higher SWB and its components (EWB and RWB) were significantly associated with lower depressive symptom scores. This finding suggested the importance of spirituality's potentially beneficial role in the psychological well-being of women living with HIV in the Southeast. Researchers have studied the relationship between spirituality and various psychological factors, but only few have examined the relationship between spirituality and depressive symptoms among women with HIV/AIDS (Braxton et al., 2007; Simoni et al., 2002; Simoni & Ortiz, 2003). In addition to corroborating previous findings, the findings of this study contributes to the body of literature on this relationship among women living with HIV. Similar to the findings of this study, previous studies have shown significant inverse relationships between spirituality and depression, among mixed groups of persons with HIV (Coleman & Holzemer, 1999; Nelson et al., 2002; Yi et al., 2004) and women with HIV (Braxton et al., 2007; Simoni et al., 2002; Simoni & Ortiz, 2003). Tuck and colleagues (2000) identified inverse associations between EWB and stress and psychological distress among persons with HIV.

Additional analyses showed that women who had high depressive symptom scores had significantly lower mean SWB, EWB, and RWB scores than women who had low depressive symptom scores. A significant relationship was also observed between spiritual/religious practices, such as prayer or meditation and reading spiritual or religious material, and a woman's depressive symptom status. More of the women who did not pray or meditate and women who did not read spiritual or religious material had high depressive symptom scores compared to women who did pray or meditate and women who read spiritual or religious material. According to Musgrave and colleagues (2002), the "expression of emotion in Black churches offers an outlet for pent-up anguish" (p. 59). Other researchers have reported that specifically among African-Americans, spirituality

serves as a strong source of guidance, healing, coping, peace, comfort, and protection during challenging times (Newlin, Knafl & Melkus, 2002). As the literature suggested, spirituality may have served as a protective psychological resource for this predominantly African-American sample of women living with HIV.

Depression is associated with alterations in immune function, specifically CD4 cell count (Ickovics et al., 2001) and CD8 T cells among women with HIV (Evans et al., 2002). However, this study failed to show a significant association between depressive symptoms and immune status. The lack of this finding may be due to methodological issues and measurement errors. Although most of the CD4 cell counts and percentages were measured within eighteen days, on average (a median of 27 days), of the assessment of depressive symptom scores, simultaneous measurement of this variable would have yielded the most valid results, because of the variable nature of CD4 cell counts.

This study was among the first few studies to identify a significant association between spirituality and immune status among women with HIV. In this study, higher EWB was weakly and significantly associated with higher CD4 cell counts and higher SWB, RWB, and EWB were all significantly associated with higher CD4 cell percentages. SWB, RWB, and EWB accounted for significant specific variance in CD4 cell percentages above and beyond that accounted for by demographic variables, HIV medication adherence, and HIV viral load (log). These findings suggested a connection between SWB components and better immune status among women with HIV. These findings add specific information about the positive associations between SWB (and its components) and CD4 cell count and percentages in HIV-positive women to the existing literature on the relationship between spirituality and physical health. A gap currently exists in the literature about the relationship between spirituality and immune status among women with HIV, since many of the studies have been conducted among mixed groups of HIV-positive persons (Bower et al., 1998; Woods et al., 1999) or people with cancer. Woods et al. (1999) found that spiritual or religious behavior, such as prayer and church attendance, was associated with higher CD4+ cell counts and percentages in a population of HIV-positive persons. Other researchers have reported about the positive association between the importance of spiritual expression and CD4+ and CD8 count among women with breast cancer (Sephton et al., 2001) and the positive association between finding meaning and CD4 cell count among HIV-positive gay men (Bower et al., 1998). Similar to this study, Ironson et al. (2006) found a significant association between spirituality/religiousness and better CD4 cell counts. These findings suggested the role of spirituality and EWB in helping to maintain a state that is favorable to CD4 cell function. Alternatively, women with HIV who report higher SWB may also have characteristics or engage in behaviors associated with better immune status.

Limitations

The major limitation of this study was the inability to make causal or temporal inferences due to the cross-sectional study design. A second limitation was the small sample size which may have resulted in insufficient power to detect statistically significant associations. Other study limitations included the limited generalizability of the study findings to clients other than low to moderate income HIV-infected predominantly African-American women on antiretroviral therapy. Within the U.S., 67% of women with HIV are primarily African-American, 25% of whom are often low-income (CDC, 2004). In Georgia, approximately 80% of women with HIV are African-American as reported by the Georgia Department of Human Resources (2006). Also, findings about the relationship between spirituality and health may only be generalizable to HIV-infected women who either identify themselves as spiritual, engage in spiritual practices, or engage in ways that add meaning and purpose to their life.

In spite of the limitations discussed, this study provides beneficial information about the interconnection between spiritual well-being, depressive symptoms, and CD4 cell count and percentage among women living with HIV/AIDS. It is important to note that the measures used identified both religious (RWB and religious practices) and non-religious (meaning and purpose in life) aspects of spirituality in the study sample. Findings indicated that spirituality is related to health and healing, and is associated with less depressive symptoms and better immune status. Findings also suggested that spirituality and the ability to find meaning and purpose in life might provide some of the support necessary to help women with HIV deal with the challenges of HIV and life, in general.

Clinical Implications

The findings of this study have several implications for healthcare: findings support the need for the incorporation of spiritual assessment into patients' plan of care and help to identify measures that may potentially facilitate psychological well-being and health among women with HIV. This information can enable health care providers to engage in more collaboration with spiritual care practitioners and mental health providers to coordinate a multidisciplinary approach to individualized patient care that may include aspects of spirituality, as appropriate (Dalmida, 2006). HIV-positive women who would like to include spirituality into their care can be empowered to become active participants in their overall plan of care and to realize the free, internal spiritual resources and spiritual support available to them. Where appropriate, efforts should be made to enhance spiritual well-being, namely one's meaning and purpose in life, among women living with HIV to facilitate improvements in psychological well-being and health. Participation in spiritual and psychological activities may be therapeutic and translate into beneficial clinical outcomes among people living with HIV (Dalmida, 2006; Fitzpatrick et al., 2007). Surveys and studies suggest that acknowledging and supporting patient spirituality may enhance overall patient care (Mueller et al., 2001), which entails addressing the needs of the whole person. The US Joint Commission on the Accreditation of Healthcare Organizations recommends and requires the routine assessment of patients' spiritual needs (Mueller et al., 2001). The study hypotheses were partially supported and future investigation is needed to identify other important variables, including mediators, in the relationships among spirituality, depressive symptoms, and immune status in women living with HIV/AIDS.

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Table 1**Sample Characteristics and Mean Instrument Scores**

Variable and Demographic	n	%	M	SD	Range
CES-D (Depressive symptoms)	129		16.18	10.96	0-49
Religious well-being	129		51.87	7.83	29-60
Existential well-being	129		46.56	9.00	22-60
Spiritual well-being total	129		98.42	15.46	56-120
Age (years)	129		42.13	8.27	24-84
CD4 count	108		290.64	222.03	15-944
CD4 percentage	108		16.24	9.42	2-50
HIV Viral load (x 1000copies/ml)	118		18.10	67.16	.05-586.78
Race/Ethnicity					
Black	118	91.5			
White	6	4.4			
Hispanic	3	2.2			
Other	2	1.5			
Educational level					
No formal education	2	1.6			
Junior high or middle school	20	15.5			
High school or G.E.D.	72	55.8			
College or Technical School	27	20.9			
Graduate or Professional School	8	6.2			
Marital Status					
Married	12	9.3			
Separated/ Divorced/ Widowed	49	34.7			
Never married	48	37.2			
Committed relationship	19	14.7			
Employment					
No	111	86.0			
Religious Service Attendance					
Never or rarely	53	41.1			
Once or twice a month	26	20.2			

Variable and Demographic	n	%	M	SD	Range
Once a week or more	49	38.0			
Prayer or Meditation					
Never	3	2.3			
1-3 times a month	14	10.9			
1-4 times a week	20	15.5			
Nearly every day	27	20.9			
Daily	64	49.6			
Reading Religious or Spiritual Materials					
Never	7	5.4			
1-3 times a month	33	25.6			
1-4 times a week	43	33.3			
Nearly every day	14	10.9			
Daily	30	23.3			
Importance of Religious or Spiritual beliefs					
Not at all important	13	10.1			
Slightly important	4	3.1			
Moderately important	8	6.2			
Quite or Very important	104	80.6			

Table 2

Bivariate Correlations of Potential Covariates with Depressive Symptom Score and CD4 Associations

	Depressive Symptom Score <i>r</i> (p value)	CD4 Count <i>r</i> (p value)	CD4 Percent <i>r</i> (p value)
Age	-.103 (.248)	.056 (.566)	-.023 (.811)
Education (< high school)	-.157 (.076)	-.223 (.021)*	-.234 (.015)*
Employment (unemployed)	.018 (.839)	-.051 (.603)	-.062 (.526)
Marital status (single)	.007 (.934)	-.001 (.991)	-.124 (.205)
HIV medication adherence	-.256 (.004)**	.145 (.147)	.080 (.425)
HIV viral load (log)	.062 (.507)	-.244 (.013)*	-.197 (.045)*
Spiritual well-being	-.547 (.000)**	.174 (.071)	.235 (.014)*
Existential well-being	-.623 (.000)**	.190 (.049)*	.220 (.022)*
Religious well-being	-.364 (.000)**	.128 (.187)	.213 (.027)*
Depressive symptoms		-.163 (.091)	-.048 (.624)

Two-tailed tests:

*
p<.05**
p<.01

Table 3
Regression Results for Variables Associated with Depressive Symptoms and CD4 Cell Count and Percentages

Dependent Variable	Model	Independent Variable	β	α	p value	R ²	ΔR^2	Adjusted R ² , ^b
Depressive Symptoms	Model 1	$F(7, 104) = 9.678, p = .0001^{**}$						
		<i>Block 1</i>				.035	.035	-.001
		Age	-.20		.424			
		Education	-2.03		.064			
		Employment status	.10		.396			
		Marital status	-.23		.967			
		<i>Block 2</i>			.914	.083	.048	.031
		HIV medication adherence	-.35		.157			
		HIV viral load (log)	.66		.069			
		<i>Block 3</i>			.438	.394	.311	.354
		SWB	-.42		.0001**			
	Model 2	$F(7, 104) = 13.01, p = .0001^{**}$						
		<i>Block 1</i>				.035	.035	-.001
		Age	-.16		.424			
		Education	-2.23		.112			
		Employment status	-.32		.318			
		Marital status	.52		.889			
		<i>Block 2</i>			.794	.083	.048	.031
		HIV medication adherence	-.40		.157			
		HIV viral load (log)	.06		.029*			
		<i>Block 3</i>			.937	.467	.384	.431
		EWB	-.77		.0001**			
	Model 3	$F(7, 104) = 4.395, p = .001^{**}$						
		<i>Block 1</i>				.035	.035	-.001
		Age	-.19		.424			
		Education	-2.78		.137			
		Employment status	.53		.303			
		Marital status	-.97		.846			
					.686			

Dependent Variable	Model	Independent Variable	β^a	p value	R ²	ΔR^2	Adjusted R ² , b
CD4 cell count	Model 1	<i>Block 2</i>		.157	.083	.048	.031
		HIV medication adherence	-.38	.084			
		HIV viral load (log)	1.09	.259			
		<i>Block 3</i>		.0001**	.228	.145	.176
		RWB	-.58	.0001**			
		<i>F(7, 90)=2.148, p = .046*</i>					
		<i>Block 1</i>		.446	.039	.039	-.003
		Age	1.68	.515			
		Education	-113.29	.042*			
		Employment status	-30.08	.604			
	Model 2	Marital status	12.57	.812			
		<i>Block 2</i>		.084	.113	.074	.055
		HIV medication adherence	2.94	.507			
		HIV viral load (log)	-50.99	.014*			
		<i>Block 3</i>		.046*	.143	.030	.076
		SWB	2.46	.079			
		<i>F(7, 90)=2.071, p = .055</i>					
		<i>Block 1</i>		.446	.039	.039	-.003
		Age	1.43	.577			
		Education	-107.43	.053			
	Model 3	Employment status	-29.63	.611			
		Marital status	14.27	.788			
		<i>Block 2</i>		.084	.113	.074	.055
		HIV medication adherence	3.36	.446			
		HIV viral load (log)	-48.28	.020*			
		<i>Block 3</i>		.055	.139	.026	.072
		EWB	3.84	.105			
		<i>F(7, 90)=2.058, p = .056</i>					
		<i>Block 1</i>		.446	.039	.039	-.003
		Age	1.61	.534			

Dependent Variable	Model	Independent Variable	β^a	p value	R ²	ΔR^2	Adjusted R ² , b
CD4 cell percentage	Model 1 <i>F</i> (7, 90) = 2.655, <i>p</i> = .015*	Education	-115.10	.041*			
		Employment status	-28.74	.622			
		Marital status	13.18	.804			
		<i>Block 2</i>			.113	.074	.055
		HIV medication adherence	2.95	.507			
		HIV viral load (log)	-53.86	.010*			
		<i>Block 3</i>			.138	.025	.071
		RWB	4.52	.110			
					.064	.064	.023
		<i>Block 1</i>					
		Age	-.03	.767			
		Education	-6.07	.010			
		Employment status	-1.01	.680			
		Marital status	-3.58	.111			
		<i>Block 2</i>			.105	.041	.046
		HIV medication adherence	.051	.786			
		HIV viral load (log)	-1.66	.056			
		<i>Block 3</i>			.171	.066	.107
		SWB	.16	.009**			
	Model 2 <i>F</i> (7, 90) = 2.177, <i>p</i> = .044*	<i>Block 1</i>			.064	.064	.023
		Age	-.06	.608			
		Education	-5.61	.018*			
		Employment status	-.93	.709			
		Marital status	-3.41	.134			
		<i>Block 2</i>			.105	.041	.046
		HIV medication adherence	.09	.639			
		HIV viral load (log)	-1.50	.088			
		<i>Block 3</i>			.145	.040	.046
		EWB	.20	.044*			

Dependent Variable	Model	Independent Variable	β^a	p value	R ²	ΔR^2	Adjusted R ² , b
Model 3 $F(7, 90) = 2.886, p = .009^{**}$							
Block 1		Age	-.02	.822	.064	.064	.023
		Education	-.640	.007**			
		Employment status	-.98	.688			
		Marital status	-3.63	.104			
		Block 2		.112	.105	.041	.046
HIV medication adherence		HIV viral load (log)	.03	.857			
		Block 3	-1.88	.030*	.183	.078	.120
HIV viral load (log)		RWB	.34	.004**			

^a betas are from the full model at the final step inthe model.

^b Adjusted R² are reported for each step in the model and includes the block of variables in that stepand previous steps.

Table 4
Mean SWB Comparisons Between Women with High (CES-D ≥ 16) and Low (CES-D < 16) Depressive Symptom Scores

Outcome Variable	Group	(n)	Mean	SD	p value
Spiritual Well-Being	Depressive Symptom Status				.0001
	High Depressive Symptoms	(73)	91.6	(14.43)	
	Low Depressive Symptoms	(56)	103.6	(14.23)	
Existential Well-Being	Depressive Symptom Status				.0001
	High Depressive Symptoms	(73)	41.8	(8.67)	
	Low Depressive Symptoms	(56)	50.2	(7.44)	
Religious Well-Being	Depression Status				.009
	High Depressive Symptoms	(73)	49.8	(7.66)	
	Low Depressive Symptoms	(56)	53.4	(7.65)	

Table 5

Associations Between Depressive Symptoms and Religious Attendance, Prayer/Meditation, and Reading Spiritual or Religious Material

Variable 1	Variable 2	χ^2	p value
Depressive Symptoms	Religious Attendance	2.76	.251
Depressive Symptoms	Prayer/Meditation	8.10	.044
Depressive Symptoms	Reading Spiritual/Religious Material	9.71	.021