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Research

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Religious and Psychosocial Covariates of Health-Related Quality of Life in People Living with HIV/AIDS

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ABSTRACT

HIV/AIDS is a chronic, highly stigmatized illness that requires significant lifestyle adjustments, including consistent adherence to Antiretroviral Therapy (ART) in order for People Living With HIV/AIDS (PLWH) to survive and maintain good immune health. PLWH often report poor or moderate Health-Related Quality of Life (HRQoL) that is worse than the general population. This may be related to the psychological and physiological demands of HIV disease and the sociodemographic stressors associated with it. The role of religious coping, religiosity, and social support in the mental and physical dimensions of HRQoL is less known, although recent studies highlight that PLWH rely on spirituality/religion to cope with HIV-associated stressors. This study examined the effects of religious coping, religiosity, depressive symptoms, medication adherence, and social support satisfaction in various dimensions of Health-Related Quality of Life (HRQoL) in a sample of 292 PLWH. Majority of participants were African-American (90.1%) and 56.2% were male. Mean age was 45 years and, on average, participants lived with HIV for nearly 11 years. Descriptive statistics, correlations, Analysis of Variance (ANOVA), and hierarchical multiple linear regression were used to analyze the data. Income, sex (β= .14), age (β= -.14), depressive symptoms (β= -.27), and social support satisfaction (β= .17) significantly predicted physical HRQoL. Results indicate that income (β= .13), sex (β= .14), medication adherence (β= .13), negative religious coping (β= -.18), religious attendance (β= .13), religiousness (β= .16), and social support satisfaction (β= .27) significantly predicted mental HRQoL. Depressive symptoms (β= -.38), positive religious coping (β= .24), and social support satisfaction (β= .16) significantly predicted general HRQoL. Participants, who were female, prayed less than daily, attended religious services less than weekly or who were non/less religious had significantly poorer HRQoL. The findings confirm the importance of religion, mental health, medication adherence and social support in the HRQoL of PLWH, which should all be routinely assessed by clinicians.

KEYWORDS: HIV/AIDS; Health Related Quality of Life; Religion; Coping; Social support; Adherence.

INTRODUCTION

People Living With HIV/AIDS (PLWH) often report poorer Health-Related Quality of Life (HRQoL) than that of the general population,[1] especially after the diagnosis of HIV.[2] This may be related to the psychological and physiological demands of HIV disease, social stressors, or demographic factors. Religion and spirituality are important social determinants

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of health and public health,[3] especially in the context of HIV/AIDS[4] and may be used by PLWH to cope and improve their HRQoL.[2,5] Religion and spirituality serve as central guiding forces in the daily life of many people,[6,7] including People Living With HIV/ADS (PLWH).[8-11] Growing evidence supports an association between spirituality or religiousness and, both, better health[6,7,12-16] and better quality of life.[2,5,6,8,17-22] Mueller et al.[6] review found that most studies identified significant associations between spirituality/religiousness and better health outcomes, including better coping skills and better health-related quality of life (even during terminal illness). The association between spirituality or religiousness and health outcomes may be explained by a number of variables, including coping style,[23,24] psychological factors,[25] and social support.[26,27] However, more research in this area and among PLWH is necessary. This is particularly important since HIV is a chronic, highly stigmatized disease and requires significant lifestyle adjustments in order for PLWH to survive and lead relatively healthy, quality lives. The purpose of this paper is to identify associations among religious and psychosocial correlates and covariates of Health-Related Quality of Life (HRQoL) among PLWH in the Southeastern US and also differences in mean HRQoL scores between groups based on socio-demographic and religious factors.

Spiritual/Religious Coping and Health Related Quality of Life among PLWH

Researchers have identified significant associations between spiritual or religious coping and a variety of health outcomes, including psychological health, physical HRQoL in PLWH.[25,28-32] The quality of life (QoL) literature highlights significant positive associations between spirituality/religiousness and overall QoL or HRQoL.[5,8,20,21,25, 28,30,33-37] However, only few studies specifically examined the association between religious coping and HRQoL among PLWH.[2,8,20,21,25,30] Additionally, only few studies have examined differences in HRQoL between groups based on religious factors in PLWH.[2,5,8,19,22]

Cross-sectional and longitudinal studies by Tsevat and colleagues[2,5,19] reported that spiritual well-being and religious coping significantly improved the QoL of PLWH. These associations have also supported by additional longitudinal studies. For example, Mrus et al.[21] studied 450 PLWH over a 12 to 18-month period and found that levels of spirituality/religiosity were associated with all baseline and follow-up HRQoL outcomes (except for "symptom bother" at baseline). They found that positive religious coping scores were positively related to overall HRQoL function, organized religious activity was positively related to higher health ratings and intrinsic religious coping was inversely related to overall HRQoL function. Change in positive religious coping and religious activity were also shown to relate to HRQoL outcomes at follow-up.[21] Likewise, in a 24-month prospective study of 226 men with HIV from the Southeastern U.S, Frame et al.[25] found that spiritual coping was not related to any mental HRQoL, but spiritual growth was associated with and significantly predicted all HRQoL outcomes at both time points. After controlling for covariates (race, education, age, marital status and CD4 cell counts), a 1 unit increase of spiritual growth was associated with a 4.74 unit increase in overall QoL ($p < .0001$), a 6.4 unit increase in role functioning ($p= .0215$), a 12.38 unit increase in emotional well-being ($p < .0001$), and a 9.49 unit increase in energy scores ($p< .0001$), at each time point.[25]

Although several researchers have identified a relationship between spiritual/religious variables, such as religious coping, and QoL, Weaver et al.[30] found that religious coping was not related to QoL in a sample of HIV-positive women. As such, the findings in this area remain mixed. Overall, the relationships between religiousness/spirituality and QoL outcomes may be partially explained by the use of religious and spiritual coping strategies, but more research is needed to specifically examine the effect of religious coping on QoL outcomes among PLWH and to investigate mediators of this relationship and mean differences in HRQoL outcomes based on socio-demographic and religious factors.

Religiousness, Religious Coping, Social Support in PLWH: Trends and Links to HRQoL

Persons' degree or level of religiousness and frequency of religious practices may affect their decisions to engage (or not engage) in religious forms of coping and may also impact their reported HRQoL. Studies show that people report a significant increase in religiousness or spirituality after an HIV diagnosis.[32,38-40] This increase may reflect an effort to cope with the physiological and psychological demands of living with HIV disease. PLWH face many stressors related directly to HIV symptoms, as well as, psycho-social stressors,[17,18,41,42] such as stigma and disclosure.[43] A number of studies have found that religious and spiritual coping are important ways of dealing with HIV-related stress[32,44-46] and spiritual perspective is an important correlate and predictor of mastery over stress in PLWH.[47]

Levels of spirituality/religiosity are not uniform among PLWH across demographic variables.[32] Two of the most common demographic trends among PLWH are that women more than men[27,48,49] and people of color more than Whites are more spiritual/religious[11,36] and use more spiritual and religious coping.[46] For example, a national, longitudinal study of 2266 PLWH,[11] found that non-White patients reported significantly higher religiousness and spirituality than White patients. Residence in the South was also associated with higher spirituality and patients with a high school or college degree reported higher religiousness than those who did not graduate from high school.[11] Grimsley[36] also found a significant relationship between ethnicity and spirituality such that average spirituality scores were higher for black patients than for white patients, but he found no significant differences in spirituality between men and women.

Other researchers have examined differences in spiritual coping practices among PLWH. Bader et al.[48] found similar demographic trends in the use of religious and spiritual coping as seen levels of spirituality and religiousness. Researchers also found that ethnic minorities more than whites use religion and spirituality to cope with HIV disease.[11,36,45,46,49,50] Tarakeshwar et al.[27] found that greater spiritual coping was associated with

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being female, being an ethnic minority, having less education, earning lower income, and being heterosexual.

PLWH often use religious and spiritual beliefs and practices to help them cope with their situation.[31,44] In one study of 80 women with HIV, researchers found that high social support and having a spiritual perspective (frequency of spiritual attendance/activities, forgiveness and importance of spirituality) were significant predictors of mastery over stress.[47] One randomized controlled trial of a spiritual mantram repetition intervention among PLWH[33] demonstrated that certain spiritual practices seem to have some QoL benefits. Borman et al.[33] found that, the mantram group improved more in QoL *during* group meetings, but the control group improved more at 22-weeks. Although no mantram group effects were noted, quality of life, total existential spiritual well-being and mean peace scores were all positively related to mantram practice by self-report or by using counters.[33]

Studies have shown that social support is positively associated with QoL in PLWH-cross-sectionally[51,52] and over time.[53,54] Burgoyne R and Renwick R[53] found that older age, lower satisfaction with social support were associated with a decline in HRQoL from baseline to the 6 month follow up and that adherence to Antiretroviral Therapy (ART) was associated with an increase in HRQoL. Swindells et al.[54] assessed 41 PLWH over a four year follow-up and identified bidirectional associations between social support and HRQoL and longitudinal data showed that poorer mental HRQoL predicted poorer emotional and informational social support.

Guiding Framework

The study was guided by the following model (Figure 1), which is based on findings from the literature. The model depicts proposed relationships between religious coping and HRQoL.

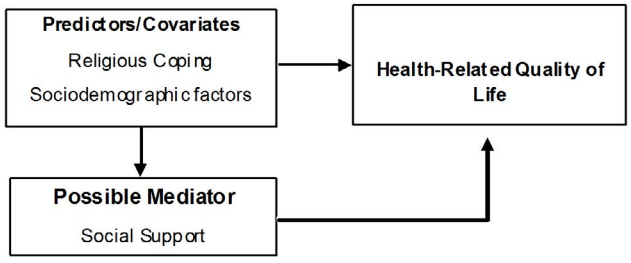

Figure 1: Model of relationships between religious coping and health related quality of life.

METHODS

Recruitment and Data Collection

The sample was recruited over a six month period from an outpatient infectious disease clinic at a large university-affiliated health center and an AIDS service organization in the Raleigh-Durham area of North Carolina. Approval was obtained from the University Institutional Review Board. Each participant provided written informed consent prior to being enrolled into the study. The sample included 292 HIV-infected men and women. Eligibility criteria required participants to be HIV-infected, 18 years of age or older, able to speak and understand English and mentally competent as determined by a screening assessment with the Mini Mental Status Exam (MMSE; scores ≥27).[55] The MMSE was administered by the Principal Investigator (PI) or a trained research interviewer and all other questionnaires were administered once using the Audio Computer Assisted Self Interview (ACASI) on laptop computers. Each participant received monetary compensation.

Measures

Demographic

Socio-demographic information was collected using a 20-item form, which asked participants about their age, race/ethnicity, gender, and year of HIV diagnosis, approximate annual and monthly income, highest level of education completed, and employment/occupation status.

Religiousness and religious practices

A modified version of the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS)[56] was used to assess religious/spiritual involvement, perspectives and behavior. Thirty-three of the original 38 items were used to assess frequency of prayer, frequency of religious service attendance, daily spiritual experiences, meaning, values/beliefs, forgiveness, religious and spiritual coping, religious support, religious/spiritual history, commitment, organizational religiousness, religious preference, and overall self-ranking (as a religious or spiritual person). There is no total score.

Religious coping

The short version of the Religious Coping Scale (RCOPE)[57] was used to assess religious coping. The Brief RCOPE is a 14-tem scale that measures 2 dimensions: positive religious coping and negative religious coping, with 7 items each.[57] Participants rate their use of individual coping strategies when dealing with difficult life situations using a 4-point rating scale from (1) “not at all” to (4) “a great deal”. Positive religious coping items include strategies such as seeking spiritual support and benevolent reappraisals. The negative religious coping scale contains items such as, “I questioned God’s love for me” and “I wondered whether God had abandoned me”. Higher summary scores represent more frequent use of the respective negative or positive religious coping strategy. In this study, Cronbach’s alpha was 0.86 for the negative RCOPE and 0.92 for the positive RCOPE subscales.

Depressive symptoms

The Center for Epidemiological Studies Depression scale (CES-D) was used to assess symptoms of depression over the previous 7 days.[58,59] The scale consists of 20 items, each of

which is scored on a 4-point frequency scale from (0) "rarely" to (3) "most or all" of the time. The CES-D scale reliability has been established and the scale has been successfully used in samples of people living with HIV/AIDS.[60,61] Cronbach's alpha was 0.91 in this study.

Medication adherence

Medication adherence was assessed using the Antiretroviral General Adherence Scale (AGAS). The AGAS is self-report tool comprised of 5 items that focus on the ability and ease of taking antiretroviral medications, as prescribed by the healthcare provider, within the previous 4 weeks.[62,63] Responses range from (1) "none of the time" to (6) "all of the time" on a Likert scale to questions such as, "I found it easy to take my H I V medications as the healthcare provider advised." AGAS scores range from 0 to 30 and higher scores indicate higher medication adherence. For this study, Cronbach's alpha was 0.78.

Social support

Satisfaction with social support was assessed using the Social Support Questionnaire -6 (SSQ -6)[64] that assess the number of available people that the individual feels he or she can turn to for support and the individual's degree of satisfaction with the perceived support available. Responses are given on a 6-point Likert scale (very dissatisfied to very satisfied). The SSQ-6 has high internal reliability, with alphas from .90 to .93. Cronbach's alpha for this study was 0.91.

Quality of life

HRQoL was measured by the RAND-36-Item Health Survey 2.0.[65] This is a 36-item tool that measures HRQoL life in eight dimensions (subscales).[65] Subscale response sets were recoded per a scoring key provided by RAND researchers where a high score denotes a more favorable state of health with a range of 0-100 (from lowest to highest). Cronbach's alphas for the subscales were: 0.90 (physical functioning), 0.86 (role limitations due to physical functioning), 0.86 (role limitations due to emotional functioning, 0.68 (energy/fatigue scale), 0.82 (emotional well-being), 0.55 (social functioning), 0.85 (pain), and 0.76 (general health). Reliability coefficients greater than 0.75 for all subscales except social functioning have also been reported by others.[66,67] The RAND 36 scale has no total score. Composite scores for physical and mental HRQoL were used. The physical health composite score is comprised of physical function, role limitations due to physical health, bodily pain, and general health subscale scores.[65,68,69] The mental health composite score is comprised of vitality (energy/fatigue), social functioning, role limitations due to emotional or personal problems, and emotional well-being subscale scores.[65,68] Cronbach's alpha were 0.80 for the physical HRQoL composite and 0.75 for the mental HRQoL composite.

Data Analysis Procedures

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistics included means, standard deviations, frequencies, and cross-tabulations were calculated. Histograms, box-plots and normality tests (Shapiro-Wilk) were used to examine the normality of the data. Bivariate correlations were employed to examine associations between variables of interest and between (dummy-coded) socio-demographic variables identified within the literature to be associated with HRQoL. We also conducted one way Analysis of Variance (ANOVA) to examine differences in mean HRQoL scores between groups based on race, education, religiousness, prayer and religious attendance. The F test (F-statistic and p-value $< .05$) indicated significant mean differences in HRQoL scores between groups based on dichotomous religious and socio-demographic covariates.

Hierarchical multiple linear regression was used to examine the variance in physical and mental HRQoL explained by religious coping. Physical and mental composite scores of HRQoL were calculated and transformed linearly into T scores as recommended by RAND researchers.[68] The physical health composite score is comprised of physical function, role limitations due to physical health, bodily pain, and general health subscale scores.[65,68] The mental health composite score is comprised of vitality (energy/fatigue), social functioning, role limitations due to emotional or personal problems, and emotional well-being subscale scores.[68] Three separate hierarchical regression models were used to examine predictors of HRQoL dimensions (physical, mental and general). A 4-block regression model was conducted using the enter method. Significant dummy coded or continuous socio-demographic covariates were entered in the first block, significant clinical variables were entered into the second block, significant religious variables entered in the second block and social support was entered in the last block. Social support was entered in the last block in order to examine unique variance explained in these HRQoL dimensions by social support and also to explore social support as a mediator of the expected association between religious coping and HRQoL. For each model, the ANOVA test (F-statistic and p-value < 0.05) for each block provided an evaluation of the overall significance of the models and various statistics, including Beta coefficients, standard error of the Betas, R-square, and R-square change, provided evaluation of the significance (p-value $<.05$) of each independent variable. R-squared and adjusted R-squared indicated the overall variance explained by each block in the model and the R-squared change statistic indicated the amount of unique variance explained in each respective HRQoL dependent variable by the added independent variable or block of variables. All reported regression coefficients are standardized coefficients and significance of each independent variable coefficient was at five percent alpha. We also explored social support as a mediator of the association between religious coping and HRQoL, using Baron and Kenney's guidelines.[70]

RESULTS

Sample Characteristics

The sample consisted of 292 HIV-infected participants

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in the Southeastern US. Their socio-demographic characteristics reflected those living with HIV in this region and nationally (Table 1). Participants' mean age was 45.1 years (*SD*=7.75). The sample was predominantly male (56.2%), Black or African American (90.1%) and U.S. born (98.3%). Approximately one third of participants were married or in a committed relationship (27.1%). More than half of the sample (58.2%) self-identified as heterosexual and almost a third identified as sexual minorities (18.8% "gay or homosexual" and 9.1% as bisexual). Majority of (88.6%) participants were unemployed or receiving disability compensation and nearly three fourths (73.0%) were impoverished, with annual incomes less than $11,000. Approximately half (53.1%) obtained a high school diploma or equivalent and one third (33.1%) completed some higher education. On average participants had been living with HIV for 10.8 years (*SD*=7.8).

Variable	n	%	
Race/Ethnicity			
Black	263	90.4	
White	18	6.2	
Birth Sex			
Male	163	56.2	
Female	127	43.8	
Educational level			
Less than high school	40	12.1	
High school or G.E.D.	154	53.1	
College or Technical School	85	29.3	
Grad or Professional School	11	3.8	
Marital Status			
Married	35	12.0	
Divorced/ Separated/ Widowed	106	36.4	
Single/Never Married	106	36.4	
Committed Relationship	44	15.1	
Employment Status			
Part-time	23	8.0	
Unemployed or on Disability	256	88.6	
Annual Income			
< $11,000	200	73.0	
≥ $11,000	74	25.3	
Sexual Orientation			
Straight or Heterosexual	167	58.2	
Gay or Homosexual	54	18.8	
Bisexual	26	9.1	
Religious Service Attendance			
Never	25	8.6	
1-2 times per year	45	15.5	
1- 2 times a month or so	106	33.2	
More than once a week	124	42.8	
Prayer			
Never	10	3.4	
Less than once per month	15	5.2	
Once or few times monthly	27	9.3	
Once or several times per week	46	15.8	
Daily or more often	192	66.2	
Identification as Religious Person			
Very	80	27.7	
Moderately	108	37.4	
Slightly	56	19.4	
Not at all	7	2.4	
Religious Affiliation			
Christian/Catholic/Adventist/ Methodist	83	28.5	
Baptist	139	48.9	
Jewish, Muslim or Buddhist	13	0.6	
Muslim	7	2.5	
Buddhist	4	1.4	
Belief in God, No Affiliation	24	8.5	
Atheist or No Belief In God	4	1.4	
Depressive symptomatology			
Depression symptoms (CESD ≥ 16)	164	56.2	
Non-depression symptoms (CESD <16)	125	42.8	
Variable	**M**	**SD**	**Range**
Age	45.1	7.75	19 - 67
Years HIV-infected	10.8	6.96	1 - 35
HIV medication adherence	24.3	5.87	5 - 30
Depressive symptoms	19.3	12.84	0 - 57
Positive religious coping	16.6	5.06	0 - 21
Negative religious coping	4.9	5.34	0 - 21
Total religious coping	21.5	7.29	0 - 42
Social support satisfaction	30.5	8.2	5 - 36

Table 1: Sample Characteristics

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A large percentage (65.1%) of participants identified as being a 'moderately' or 'very' religious person and only 2.4% identified as being a non-religious person. Participants were predominantly Christian (77.4%) - almost half of whom were Baptist (48.9%). A large proportion of the sample engaged in regular religious service attendance (76.0%, ≥ 2 times/week or 1-2 times/month) and frequent prayer (66.2%, daily or more often).

On average, the sample reported a high amount of depressive symptoms during the 7 days prior to the interview (Table 1). According to a cut-off score established by Radloff[59] of 16 or above, scores on the CES-D reflecting depressive symptomatology may indicate probable depression. The average CES-D score was moderately high (19.3 ± 12.8) and more than half of the participants (56.2%) had depressive symptoms (CES-D scores ≥ 16, Table 1). On average, participants reported high satisfaction with their social support (30.5 ± 8.2) and moderate adherence to antiretroviral therapy (24.3 ± 5.9). Participants also reported moderate HRQoL in all dimensions (Table 2), on average.

Correlates and Covariates of HRQoL

All independent and outcome variables were determined to be non-normally distributed using histogram, boxplots and normality tests (Shapiro-Wilk). Therefore, Spearman's Rho correlations were used to identify significant covariates of HRQOL (Table 2). Physical HRQOL composite scores were significantly inversely correlated with depressive symptoms (r= -.46), negative religious coping (r= -.28), age (r= -.12), years HIV-positive (r= -.12) and significantly positively correlated with social support satisfaction (r= .33), medication adherence (r= .22), and income (r= .22). Better physical HRQOL was also significantly associated with being male (r= .18) and being married or in a committed relationship (r= .21). Mental HRQOL composite scores were significantly inversely correlated with depressive symptoms (r= -.74) and negative religious coping (r= -.36). The high correlation between mental HRQoL and depressive symptoms was likely due to multicollinearity and overlap in the mental health aspects assessed.

Mental HRQoL was significantly positively correlated with positive religious coping (r= .18), social support satisfaction (r= .42), medication adherence (r= .34), and income (r= .16). Better mental HRQoL scores were also significantly correlated with being a male (r= .12), being married (r= .17), attending religious services weekly or more (r= .26), praying daily or more often ((r= .14), and self-identification as a 'very' or 'moderately' religious person (r= .17).

General HRQoL was significantly: inversely correlated with depressive symptoms (r= -.37), negative religious coping (r= -.26), years HIV-positive (r= -.16), and age (r= -.15) and positively correlated with positive religious coping (r= .29), social support satisfaction (r= .34), and medication adherence (r= .22). Better general HRQoL was also significantly correlated with self-identification as a 'very' or 'moderately' religious person (r= .12).

Depressive symptoms, medication adherence, negative religious coping, and social support satisfaction significantly related to all HRQoL scores. Marital status significantly correlated with both HRQoL composites and 7 of the 8 subscale scores. Positive religious coping significantly correlated with the mental HRQoL composite and 4 subscale scores. Income significantly correlated with both HRQoL composites and 6 subscale scores. Religious attendance and religiousness significantly correlated with mental HRQoL and 4 subscale scores. Other variables were less consistent correlates across HRQoL dimensions.

Regression Results Predicting HRQoL Scores

The model estimating physical HRQOL (Table 3) showed that physical HRQOL scores significantly: *increased by* (1) 0.20 points for every dollar increase in income (β= .20, p= .001), (2) .14 points for males (β= .14, p= .024), and (3) .17 points for every unit increase in social support satisfaction (β= .17, p= .015) and *decreased by* (4) .14 points for every year increase in age (β= -.14, p= .026) and (5) .27 points for every unit increase in depressive symptoms (β= -.27, p= .000). The F-test for the full model was significant (F=9.51, p=.000), thereby supporting the fit of the model, which explained 27.0% of the variance in physical HRQoL (Adjusted R^2= .270). Demographic variables accounted for 13.1% (R-Square change= .131, Significant F change=.000), clinical variables for 14.7% (R-Square change= .147, Significant F change=.000), and social support for 2.1% (R-Square change= .021, Significant F change=.015).

Results from the model estimating the mental HRQoL composite (Table 3, middle) showed that income (β= .13, p= .032), sex (β= .14, p= .002), medication adherence (β= .13, p= .04), negative religious coping (β= -.18, p= .005), religious attendance (β= .13, p= .04), religiousness (β= .16, p= .01), and social support satisfaction (β= .27, p= .000) explained significant variance in mental HRQoL. Mental HRQoL scores *increased by* 1) 0.13 points for every unit increase in income, 2) .14 points for males, and 3) .13 points for every unit increase in medication adherence, 4) .13 points for participants who attend religious services weekly or more often, 5) .16 points for participants who identify as a 'moderately' or 'very' religious person, and 6) .27 points for every unit increase in social support satisfaction. Mental HRQoL scores *decreased by* .18 points for every unit increase in negative religious coping.

The F-test for each block and the full model was significant (F=9.05, p=.000), supporting the fit of the model. The full model explained 26.6% of the variance in physical HRQoL (Adjusted R-Square = .266), significantly accounted for by demographic variables (6.2%) (R-Square change= .062, Significant F change=.003), medication adherence (7.4%) (R-Square change= .074, Significant F change=.000), religious variables (10.5%) (R-Square change= .105, Significant F change=.000), and social support satisfaction (5.8%) (R-Square change= .058, Significant F change=.000). Negative religious coping was significant in Block 3 (β= -.23, p=.000, not shown) and also remained significant in the final block when social support satisfaction was

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HRQoL Variables	1	2	3	4	5	6	7	8	9	10
1. Physical HRQoL[a]	-									
2. Mental HRQoL[b]	.72***									
3. General health	.62***	.48***	-							
4. Physical role limitations	.85***	.63***	.37***	-						
5. Emotional role limitations	.58***	.85***	.32***	.61***	-					
6. Vitality (Energy/ fatigue)	.68***	.80***	.55***	.52***	.53***	-	-			
7. Emotional well-being	.52***	.81***	.46***	.38***	.54***	.63***	.63***	-		
8. Social function-ing	.61***	.84***	.35***	.50***	.56***	.63***	.42***	.46***	-	
9. Physical func-tioning	.81***	.51***	.40***	.57***	.37***	.42***	.42***	.57***	.54***	-
10. Pain	.77***	.57***	.37***	.51***	.39***	.42***				
Covariates							-.75***	-.64***	.30***	-.41***
Depressive symptoms	-.46***	-.74***	-.37***	-.39***	-.53***	-.56***	.20**	.10	-.04	.05
Positive RCOPE	.08	.18**	.29***	.04	.14*	.21***	-.43***	-.33***	-.26***	-.18**
Negative RCOPE	-.28***	-.36***	-.26***	-.22***	-.25***	-.21***	.34***	.34***	.24***	.30***
Social support[c]	.33***	.42***	.34***	.22***	.33***	.36***	.33***	.31***	.21***	.15*
Medication adherence	.22***	.34***	.22**	.16*	.25***	.26***	-.04	-.04	-.09	-.08
Years HIV-positive	-.12*	-.05	-.16**	-.05	-.07	.01	.02	-.01	-.08	-.08
Age	-.12*	.01	-.15*	-.04	.04	.02	.07	.11†	.17**	.15*
Sex[d]	.18**	.12*	-.01	.19***	.12†	.10	.11†	.17**	.26***	.14*
Income[e]	.22**	.16**	.11†	.19**	.13*	.14*	.14*	.16**	.16**	.20***
Marital status[f]	.21***	.17**	.14*	.16**	.11†	.16**	.26***	.26***	-.02	.10†
Religious at-tendance[g]	.08	.26***	.07	.07	.19**	.18**	.18**	.11†	.03	.05
Prayer[h]	.08	.14*	.10†	.07	.12*	.10	.15**	.15*	.03	.10†
Religiousness[i]	.09	.17**	.12*	.02	.10†	.18**	62.4	67.0	58.7	60.4
M	50.0	50.0	53.5	47.9	52.4	53.1	23.8	29.4	28.6	29.9
SD	11.0	11.0	21.2	11.0	44.2	21.6	8 - 100	0 - 100	0 - 100	0 - 100
Range	25.0- 8.5	25.0- 68.5	5.0- 95.0	26.9-69.7	0 - 100	0 - 100				

[a]Physical health-related quality of life composite score.[b]Mental health-related quality of life composite score. [c]Social support satisfaction: scored from 1 for very dissatisfied to 6 for very satisfied. [d]Birth Sex: :0 = female, 1 = male. [e]Annual income: 0 = < $11,000, 1= ≥ 11,000. [f]Marital status: 0 = separated, widowed, divorced, never married, 1= married or in a committed relationship. [g]Religious attendance: 0 = less than weekly, 1= weekly or more. [h]Prayer: 0= Less than daily, 1= Daily or several times daily. [i]Religiousness: 0 = 'not at all' and 'slightly', 1= 'very' and 'moderately'. *p < .05. **p < .01. ***p < .001. †p < .10.

Table 2: Religious, Psychosocial and Demographic Covariates of Health-Related Quality of Life: Correlations and Descriptive Statistics

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entered into the model, which suggests that the association between negative religious coping and mental HRQoL is not mediated or explained by social support satisfaction.

The model estimating general HRQoL (Table 3, bottom) was a good fit (F = 6.06, p= .000) and shows that depressive symptoms, positive religious coping, and social support satisfaction explained significant variance in general HRQoL. General HRQoL scores *increased by* .24 points for every unit increase in positive religious coping (β= .24, p= .002) and by .16 points for every unit increase in social support satisfaction (β= .16, p= .024) and *decreased by* .38 points for every unit increase in depressive symptoms score (β= -.38, p= .004).

The full model explained 20.3% of the variance in general HRQoL (Adjusted R^2= .203). Demographic variables (age, marital status) significantly accounted for 3.2% of this variance (R-Square change= .032, Significant F change=.029). Clinical variables (years HIV-positive, depressive symptoms, medication adherence) significantly accounted for 13.2% variance (R-Square change= .132, Significant F change=.000). Religious variables (negative and positive religious coping, prayer, religious attendance, religiousness) significantly accounted for 6.1% of this variance (R-Square change= .061, Significant F

Variable	Overall F-test	*Beta*[a]	Standardized Beta	t	*df*	*p*-value	R^2	Adjusted R^2	R^2 Change	Sig. F Change
Dependent: Physical HRQoL[b]										
Block 1 (Demographic)	7.65				4, 203	**.000**	.131	.114	.131	**.000**
Income[c]		5.10	.20	3.36		**.001**				
Sex[d]		3.18	.14	2.28		**.024**				
Age		-.20	-.14	-2.24		**.026**				
Marital status[e]		2.18	.09	1.39		.167				
Block 2 (Clinical)	10.99				7, 200	**.000**	.278	.253	.147	**.000**
Years HIV-positive		-.07	-.04	-.66		.513				
Depressive symptoms		-.24	-.27	-3.68		**.000**				
Medication adherence		.16	.08	1.21		.226				
Block 3 (Religious)	9.69				8, 199	**.000**	.280	.251	.002	.413
Negative RCOPE		-.09	-.04	-.63		.531				
Block 4 (Social Support)	9.51				9, 198	**.000**	.302	.270	.021	**.015**
Social Support[f]		.24	.17	2.46		**.015**				
Dependent: Mental HRQoL[f]										
Block 1 (Demographic)	4.84				3, 219	**.003**	.062	.049	.062	**.003**
Income		3.08	.13	2.16		**.032**				
Sex		3.05	.14	2.30		**.002**				
Marital status		2.30	.09	1.59		.113				
Block 2 (Clinical)	8.59				4, 218	**.000**	.136	.120	.074	**.000**
Adherence		.24	.13	2.04		**.042**				

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Block 3 (Religious)	7.52				9, 213	**.000**	.241	.209	.105	**.000**
Negative RCOPE		-.37	-.18	-.28		**.005**				
Positive RCOPE		-.07	-.03	-.42		.673				
Prayer[g]		-.28	-.01	-.19		.853				
Religious attendance[h]		2.88	.13	2.01		**.046**				
Religiousness[i]		4.19	.16	2.56		**.011**				
Block 4 (Social Support)	9.05				10, 212	**.000**	.299	.266	.058	**.000**
Social Support		.38	.27	4.19		**.000**				
Dependent: General HRQoL[j]										
Block 1 (Demographic)	3.59				2, 216	**.029**	.032	.023	.032	**.029**
Age		-.33	-.12	-1.83		.068				
Marital status		1.10	.02	.349		.728				
Block 2 (Clinical)	8.34				5, 213	**.000**	.164	.144	.132	**.000**
Years HIV-positive		-.35	-.11	-1.75		.082				
Depressive symptoms		-.38	-.22	-2.90		**.004**				
Adherence		.40	.10	1.50		.136				
Block 3 (Religious)	6.03				10, 208	**.000**	.225	.187	.061	**.007**
Negative RCOPE		-.14	-.03	.47		.643				
Positive RCOPE		.98	.24	3.07		**.002**				
Prayer		.68	.02	.21		.833				
Religious attendance		-5.97	-.14	-1.94		.053				
Religiousness		.63	.01	.18		.855				
Block 4 (Social Support)	6.06				11, 207	**.000**	.244	.203	.019	**.024**
Social Support[d]		.43	.16	2.27		**.024**				

[a]βetas and p-values reported are from the final block in each model and p-values, R2, Adjusted R2 and R2 change are reported for each step in the model and includes the block of variables in that step and previous steps. [b]Physical health-related quality of life composite score. [c]Annual income: 0 = < $11,000, 1= ≥ 11,000. [d]Birth Sex: :0 = female, 1 = male. [e]Marital status: 0 = separated, widowed, divorced, never married, 1= married or in a committed relationship. [f]Social support satisfaction scored from 1 (very dissatisfied) to 6 (very satisfied). [f]Mental health-related quality of life composite score. [g]Religious attendance: 0 = less than weekly, 1= weekly or more. [h]Prayer: 0= Less than daily, 1= Daily or several times daily. [i]Religiousness: 0 = 'not at all' and 'slightly', 1= 'very' and 'moderately'. *<.05, ** <.01

Table 3: Hierarchical Regression Results for Health-Related Quality of Life Components

change=.007), and social support satisfaction significantly accounted for 1.9% unique variance (R-Square change= .019, Significant F change=.024). Only positive religious coping was significant in Block 3 (β= -27, *p*=.001, not shown) and also remained significant in the final block of the model when social support satisfaction was entered into the model, which suggests that the relationship between positive religious coping and general HRQoL is not mediated or explained by social support satisfaction. Religious attendance was a significant predictor of general HRQoL in Block 3 (β= -.144, *p*=.044, not shown), but only approached significance (β= -.137, *p*= .053) in the final block once social support was entered into the model. This suggests that the once significant association between religious attendance and general HRQoL was mediated by social support.

Group Differences in Mean HRQoL Scores

Results of one way ANOVA (Table 4) showed that participants who were female, prayed less than daily, attended religious services less than weekly or who identified as a 'not at all' or only 'slightly' religious person had significantly lower mean scores on several of the HRQoL dimensions, indicative of poorer HRQoL. Compared to males, females had significantly lower mean scores on: mental HRQoL (48.5 *vs.* 51.2), physical

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HRQoL (47.8 *vs.* 51.8), and physical functioning (53.2 *vs.* 62.8). On average, females also reported less role limitations due to physical problems (39.1 *vs.* 54.8) and less bodily pain (55.4 *vs.* 64.3), which are indicative of significantly better HRQoL in these dimensions. Participants who prayed less than daily (compared to participants who prayed daily or more often) had significantly poorer mental HRQoL (47.8 *vs.* 51.2) and emotional well-being (56.5 *vs.* 65.5). On average, participants who attended religious services less than weekly (*vs.* those who attended weekly or more often) had significantly lower mental HRQoL (47.4 *vs.* 53.4), social functioning (57.8 *vs.* 63.8), emotional well-being (56.8 *vs.* 69.8), and vitality (less energy: 49.5 *vs.* 57.9), but they also reported less role limitations due to emotional problems (45.4 *vs.* 61.8), which are indicative of better HRQoL in this dimension. Participants who identified as non-religious or slightly religious (*vs.* more religious participants) reported significantly lower mental HRQoL (46.9 *vs.* 51.1), general health (48.9 *vs.* 55.2), energy (46.3 *vs.* 55.5), emotional well-being (56.0 *vs.* 64.7), and social functioning (60.0 *vs.* 69.4).

Group Differences in Mean Religious Coping Scores

In order to better understand the role of religious coping in HRQoL, we also examined mean differences in religious coping scores between groups based on demographic factors previously identified in the literature (race, education) using one way ANOVA. Results indicated that, on average, Blacks (compared to non-Blacks) reported significantly higher positive religious coping scores (M =16.8±4.8, n=263 *vs.* M = 14.7±6.6, n=28; p= .033). Similarly, participants with a high school diploma/equivalent or higher (compared to those with less than a high school diploma or equivalent) reported significantly higher positive religious coping, on average (M =17.0 ± 4.8, n=263 *vs.* M = 14.1 ± 5.9; p= .011). There were no significant mean differences in religious coping scores based on sex.

DISCUSSION

This study identified significant demographic, clinical and religious correlates of various dimensions of HRQoL and differences in mean HRQoL scores between groups (based on gender and religious factors) among PLWH in the Southeastern U.S. The findings highlight the role that religious coping and religiosity in the HRQoL of PLWH in this "bible belt" region of the U.S. Similar to previous findings, including a national study of PLWHA,[4,8,11,17] many PLWH in our sample identified as religious and frequently engaged in private religious practice (prayer) and their frequency of religious attendance varied.

One of our main findings was that religious coping significantly predicted mental HRQoL and general health beyond demographic and clinical covariates. These findings are consistent with previous studies.[2,8,20,21] These associations were also without mediation by social support satisfaction. More specifically, frequent religious attendance (weekly or more) and self-identification as a 'moderately' or 'very' religious person was associated with better mental HRQoL and negative forms of

	Sex			Prayer			Religious Attendance			Religiousness		
Variable	***p***	**Female *M* (n)**	**Male *M* (n)**	***p***	**< Daily *M* (n)**	**≥ Daily *M* (n)**	***p***	**< Weekly *M* (n)**	**Weekly *M* (n)**	***p***	**Not at all/ Slightly M (n)**	**Very/ Moderate *M* (n)**
Mental HRQoL	**.041**	48.5 (125)	51.2 (163)	**.015**	47.8 (97)	51.2 (191)	**.000**	47.4 (165)	53.4 (124)	**.004**	46.9 (75)	51.1 (213)
Physical HRQoL	**.002**	47.8 (127)	51.8 (163)	.169	48.8 (98)	50.6 (192)	.210	49.3 (166)	51.0 (124)	.159	48.5 (76)	50.6 (213)
Physical functioning	**.004**	53.2 (127)	62.8 (163)	.569	57.3 (98)	59.3 (191)	.678	59.3 (166)	57.9 (124)	.399	56.4 (76)	59.7 (213)
General health	.950	53.4 (127)	53.6 (163)	.061	50.2 (98)	55.2 (192)	.129	51.9 (166)	55.7 (124)	**.000**	48.9 (76)	55.2 (213)
Physical role limits	**.002**	39.1 (125)	54.8 (163)	.231	43.8 (97)	50.1 (191)	.254	45.5 (165)	51.1 (124)	.802	46.7 (75)	48.1 (213)
Emotional role limits	.056	46.9 (125)	57.0 (163)	.059	45.7 (97)	56.1 (191)	**.002**	45.4 (165)	61.8 (124)	.089	44.9 (75)	55.0 (213)
Vitality (energy/ fatigue)	.133	50.8 (125)	54.7 (163)	.062	49.7 (97)	54.8 (191)	**.001**	49.5 (165)	57.9 (124)	**.001**	46.3 (75)	55.5 (213)
Emotional well-being	.250	60.5 (125)	63.8 (163)	**.002**	56.5 (97)	65.5 (191)	**.000**	56.8 (165)	69.8 (124)	**.006**	56.0 (75)	64.7 (213)
Social functioning	.055	63.3 (125)	70.0 (163)	.148	63.5 (97)	68.8 (191)	**.000**	60.3 (165)	76.0 (124)	**.017**	60.0 (75)	69.4 (213)
Pain	**.012**	55.4 (125)	64.3 (163)	.443	58.5 (97)	61.4 (191)	.096	57.8 (165)	63.8 (124)	.097	55.6 (75)	62.3 (213)

Table 4: Differences in Mean Health-Related Quality of Life Outcomes by Sex and Religious Factors

religious coping (*i.e.* thinking that the devil made it happen or that things are the way they are because God does not care about them) was associated with poorer mental HRQoL. Better medication adherence, income and social support satisfaction was also associated with better mental HRQoL. Better physical HRQoL was associated with higher income, younger age, less depressive symptoms and better social support satisfaction and could not be significantly explained by religious coping or religious factors. More positive forms of religious coping (*i.e.* working together with God), less depressive symptoms and greater satisfaction with social support was associated with better general health.

Similar to other studies among PLWH,[2,5,8,19-22] this study identified associations between HRQoL and religious factors. Previous studies primarily identified associations between religious faith, religious affiliation[22] or spiritual well-being[5] and QoL. Similar to our findings, three of these studies[2,20,21] identified that religious coping was associated with better HRQoL. Tsevat et al.[2] and Trevino et al.[20] also showed this finding over time. According to Tsevat et al.,[5,19] the concept of "the will to live" may help to explain the beneficial role of spirituality/religion and religious coping in QoL outcomes among PLWH. Their model purports that religious attendance, prayer, and self-rated religiousness contribute to meaning, peace and use of religious coping, which contribute to healthier lifestyle and beliefs, self-perception, and social support, thereby leading to improved QoL perceptions and "will to live".

We found that, on average, Blacks and participants with greater than high school level education reported using more positive forms of religious coping. These differences are consistent with previous reports[11,27,36,45,49,50] and are especially important to consider in HIV case management and care. However, unlike these previous studies, our study did not identify any significant gender differences in the use of religious coping.

The differences in mean HRQoL composite and subscale scores between males and females were similar to previous findings[71] and highlight the disparities that exist in HRQoL between males and females. As expected, females had significantly poorer mental and physical HRQoL, and physical functioning than males. The finding that females report significantly less bodily pain was unexpected since most studies indicate that, in general, women report more pain and/or have lower pain tolerance than men.[72,73] Ruau et al.[72] also found that women with HIV report higher pain scores than HIV-infected men. In spite of previous findings, our finding may be due to participants' responses to questions about pain in the context of HRQoL, which may depend on various factors including pain intensity, frequency and duration required to significantly impact their perception of the role of bodily pain in affecting their HRQoL. Similarly, in our sample, females reported significantly lower role limitations due to physical problems, on average, which was unexpected, especially since they also had poorer average scores in physical health dimensions, including energy, overall. These findings may reflect the notion of the resiliency of females, who often push and persevere through physical and other challenges in attempt to fulfil the multiple roles and responsibilities that many females have (*i.e.* mother/caregiver, wife/partner, homemaker etc.). Therefore, the poorer physical health of females in our sample may not have been severe enough to limit their roles.

Our findings also identified differences in HRQoL scores based on less studied religious factors. Among PLWH in our sample, those who: (1) prayed at least daily had better mental HRQoL and emotional well-being, (2) attended religious services at least weekly had significantly better mental HRQoL, emotional well-being, social functioning and more energy/less fatigue, and (3) were more religious had significantly better mental HRQoL, general health, energy, emotional well-being and social functioning- than their counterparts.

Limitations

The cross-sectional design used in this study limits the ability to make causal inferences about the associations observed. Findings may also only be generalizable to PLWH with similar demographic and religious characteristics of those included in our sample. Despite these limitations, the findings from this study provide additional important insight regarding the demographic, clinical, religious and social factors that relate to the HRQoL of PLWHA.

Conclusions

These findings confirm the importance role that religious coping, religious practices and personal religiosity play in the general health, and HRQoL of PLWH. They also highlight the role of social support and clinical factors, including medication adherence and depressive symptoms in affecting their HRQoL. Therefore, it is imperative that clinicians routinely assess all of these factors and make the appropriate referrals, as necessary. Substantially more research is needed to validate and clarify the current literature on the relationship between religious coping (both positive and negative) or other religious factors and HRQoL dimensions and to better understand the mechanisms of action. Longitudinal studies are needed to identify causal relationships and changes over time. Findings from this study and future studies could be used to inform the development of interventions to help support and improve HRQoL that take into account the religious interests and coping practices of PLWH.

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