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Religiosity, social support and ethnic identity: Exploring “resilience resources” for African-American women experiencing HIV-related stigma

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Abstract

Introduction: African-American women living with HIV report substantial HIV-related stigma and depression. Resilience resources are strength-based resources that may moderate the effects of HIV-related stigma on poor psychosocial outcomes such as depression.

Objective: To evaluate whether religiosity, social support and ethnic identity moderate the effects of HIV-related stigma on depression among African-American women living with HIV.

Methods: We used baseline data (5/2013–10/2015) from a randomized controlled trial testing the efficacy of an HIV-related stigma reduction intervention among African-American women living with HIV in Chicago, IL and Birmingham, AL who were >18 years old and currently receiving HIV services. To assess whether religiosity (7-item Religious Beliefs and Behaviors survey, RBB), social support (select subscales from the Medical Outcomes Study Social Support Survey, MOS-SSS), and ethnic identity (Commitment subscale from the Multigroup Ethnic Identity Measure, MEIM-R) modified the relationship between HIV-related stigma (Stigma Scale for Chronic Illness, SSCI) and depression (8-item Patient Health Questionnaire, PHQ-8), we conducted three separate moderation analyses using linear regression with interactions between HIV-related stigma and each moderator of interest, adjusted for study site, age, time since diagnosis, and education.

Results: Among 226 African-American women living with HIV, greater levels of HIV-related stigma were associated with greater depression in all three models ($p < 0.05$). Only religiosity modified this association ($p = 0.04$), with a weaker association among women reporting higher levels of religiosity.

Conclusions: The protective effects of religiosity may be leveraged in interventions for African-American women living with HIV struggling with HIV-related stigma.

Keywords

African-American women; depression; ethnic identity; HIV-related stigma; religiosity; social support

BACKGROUND

In the United States (U.S.), African-American women exist at the intersection of disadvantaged race and gender; a position which makes them uniquely vulnerable to HIV.^{1–4} In 2015, African-American women accounted for 12% of all U.S. women, but 61% of new HIV infections among U.S. women.⁵ African-American women living with HIV are also particularly vulnerable to underreceipt of antiretroviral therapy (ART), adverse effects associated with poor treatment,^{6–8} and high rates of morbidity and mortality.^{9,10}

African-American women living with HIV also report substantial HIV-related stigma and depression. HIV-related stigma refers to the, “prejudice, discounting, discrediting and discrimination that are directed at people perceived as having HIV.”¹¹ Negative experiences with HIV-related stigma are well-documented among African-American women living with

HIV,^{12–15} and these experiences have been associated with isolation,¹⁶ decreased psychological functioning,¹⁷ and other symptoms of depression.^{18–20} Moreover, many African-American women experience other forms of stigma on account of race, gender and socioeconomic status.^{21–23} Simultaneous sources of stigma are a manifestation of intersectionality, the convergence of social identities and structural inequalities that produce magnified experiences of disadvantage.²⁴ Because HIV-related stigma may intensify existing inequalities,²⁵ addressing HIV-related stigma among African-American women living with HIV is particularly important.

Strategies to address HIV-related stigma in the context of intersectionality emphasize promoting resilience,^{3,26,27} or the ability to identify and employ resources and protective factors to assist with coping in adversity.²⁸ Earnshaw et al. (2013) defined resilience resources as “modifiable strength-based moderators that may be appropriate targets for intervention.”²⁶ For African-American women living with HIV who experience HIV-related stigma, there is evidence that religiosity, social support, and ethnic identity may be resilience resources; that is, these resources may buffer the negative effects of HIV-related stigma on poor psychosocial outcomes such as depression.^{29–31}

Religiosity is a multidimensional construct with varying definitions.^{32,33} Here, we use religiosity to refer to formal and informal participation in religious activities (e.g., attending religious ceremonies or engaging in private prayer). This definition also includes manifestations of personal spirituality, as these two concepts are not always distinguishable.³⁴ Historically, religiosity is a recognized source of support for African-American women that fosters positive action and outcomes.^{35–38} Though the role of religion and religious groups in the HIV epidemic has not always been supportive (and even damaging),³⁹ research indicates that religiosity is associated with general psychological well-being among African-American women living with HIV,⁴⁰ and provides motivation to maintain healthy behaviors.¹⁶ Additionally, African-American women living with HIV have indicated that spiritual practice enhances their clinical care,⁴¹ and supporting a spiritual practice may be important when addressing depression in this population.²⁹

Social support is another potential resilience resource for African-American women living with HIV. Throughout the HIV epidemic, greater social support has been consistently associated with lower HIV-related stigma among people living with HIV (PLWH).^{42,43} Furthermore, among women living with HIV, social support has been associated with reduced loneliness, stress, and depressive symptoms.³⁰ African-American women living with HIV have explicitly voiced desire for emotional and instrumental support,⁴⁴ and highlighted support as a mechanism for resisting the negative impact of HIV-related stigma.¹² In one study of African-American women living with HIV, disclosure, an act largely associated with increased social support,⁴⁵ moderated the relationship between HIV-related stigma and distress.¹⁷ Collectively, these findings indicate that social support has the capacity to buffer the effects of HIV-related stigma on depression in this population.

Finally, while African Americans are frequently considered a racial group, Cornell and Hartman (2006) argue that they are also a distinct ethnic group.⁴⁶ Furthermore, because African-Americans are an ethnic minority group with a long history of discrimination in the

United States, ethnic identity has particular salience.^{47–49} Specifically, research indicates that this strong sense of ethnic identity may serve to promote resilience in situations of stigma and discrimination.^{50,51} Among African Americans, greater ethnic identity is associated with lower anxiety, depression and psychological stress and greater coping, optimism and self-esteem.^{31,52,53} Moreover, among a sample of young African-American women, stronger ethnic identity was associated with less HIV-related risk-taking,⁵⁴ and in a sample of (predominately African-American) women living with HIV, greater ethnic identity was associated with less perceived stress.⁵⁵

The purpose of this study is to formally evaluate whether these three resilience resources buffer the negative effects of HIV-related stigma among African-American women with HIV. Specifically, we aim to estimate and test the moderating effects of 1) religiosity, 2) social support, and 3) ethnic identity on the association between HIV-related stigma and depression within a sample of African-American women living with HIV.

METHODS

Data source

This study is a secondary analysis of baseline data from the Unity Study, a multisite randomized controlled trial evaluating the longterm effectiveness of an HIV-related stigma-reduction intervention for African-American women living with HIV.⁵⁶ From 2013 to 2015, African-American women living with HIV were recruited from three clinical sites that provide HIV care: Northwestern University Infectious Diseases HIV clinic (NU) and the Ruth M. Rothstein CORE Center (CORE) in Chicago, Illinois and the University of Alabama, Birmingham 1917 HIV Clinic (UAB) in Birmingham, Alabama.

Study sample

To participate in the Unity Study, individuals needed to self-identify as African-American women, be 18 years old, and be currently receiving HIV services. Women were excluded if they were foreign-born and had lived in the US for less than 10 years. Baseline data from Unity Study participants were included in the current study if they had at least partial responses to all measures of interest.

Data collection

After providing consent, participants met with a research staff member to complete baseline assessments (demographics and psychosocial measures) via tablet-based audio computer assisted self-interview (ACASI). All Unity Study procedures were reviewed and approved by the Institutional Review Boards (IRB) at the University of Washington, NU, CORE, and UAB.

Measures

Outcome.—Depressive symptom severity was measured continuously using the 8-item Patient Health Questionnaire (PHQ-8).⁵⁷ The PHQ-8 is a validated, abridged version of the PHQ-9 (suicidality item omitted) and is commonly used for screening, diagnosing, and monitoring depression.⁵⁸ Regarding the preceding two weeks, participants respond to

questions such as, “Have you been feeling down, depressed or hopeless?” and rank them on a 4-point Likert-type scale from 0 (*Not at all*) to 3 (*Nearly every day*). Responses are summed to create a total score ranging from 0 to 24. Higher scores reflect greater severity, with clinical cut-points as follows: (0–4: minimal depression, 5–9: mild depression, 10–14: moderate depression, 15–19: moderately severe depression, 20–24: severe depression.⁵⁷

Predictor.—HIV-related stigma was measured continuously using the 14-item Stigma Scale for Chronic Illness (SSCI). The SSCI is a scaled measure of perceived and internalized stigma that has been validated for use with African Americans living with HIV.^{59,60} Participants are offered statements such as, “Because of my illness, people were unkind to me” and asked to respond on a 5-point Likert-type scale ranging from 1 (*Never*) to 5 (*Always*). Responses are summed to create a total score ranging from 14 to 70, with 14 indicating no reported HIV-related stigma and higher scores reflecting greater HIV-related stigma. For the Unity Study, participants were instructed to think of the past month and consider HIV as their “illness.”

Moderators.—Moderators included religiosity, social support, and ethnic identity. Religiosity was measured continuously using the 7-item version of the Religious Beliefs and Behaviors survey (RBB). The RBB assesses God consciousness (i.e. thinking about God) and formal religious practices over the past year, and demonstrated good internal consistency in a African-American church-based sample.^{61,62} Participants are first asked to select the term that best describes their level of God consciousness from 0 (*Athiest*) to 4 (*Religious*). Then, participants are asked how often they engaged in religious activities (e.g., prayer). Participants respond using an 8-point Likert scale from 0 (*Never*) to 7 (*More than once a day*). Factor subscale scores are summed for an overall religiosity score ranging from 0 to 46, with higher scores reflecting greater religiosity.

Social support was measured continuously using select subscales (Emotional/Informational Support and Positive Social Interaction) of the Medical Outcomes Study Social Support Survey (MOS-SSS).⁶³ The MOS-SSS is widely used and all subscales have demonstrated good internal consistency.⁶³ Participants answer questions regarding how often certain types of social support (e.g. someone to give you good advice about a crisis) are available by responding on a 5-point Likert scale from 1 (*None of the time*) to 5 (*All of the time*). For this study, an overall support score (range 1–5) was calculated by averaging all items from the two select subscales.

Ethnic identity was measured continuously using the Commitment subscale of the revised Multigroup Ethnic Identity Measure (MEIM-R).^{47,48} The Commitment subscale assesses attachment and belonging to an individual’s ethnic or racial group, demonstrates good internal consistency, and can be used independently of the full instrument.⁴⁸ Participants respond to statements such as, “I have a strong sense of belonging to my own ethnic group” on a Likert-type scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*). A subscale score is generated by taking an average of the individual items resulting in scores between 1 and 5. For the Unity Study, participants were prompted to consider Black/African-American as their ethnic group.

Covariates.—Covariates were chosen *a priori* based on their potential to confound the association between HIV-related stigma and depression, and included study site (NU, CORE, UAB); age in years (continuous);^{42,64} time since diagnosis in years (continuous);^{65–67} and education (less than high school, high school degree or equivalent, some college, or college degree and beyond).^{42,68} Alcohol, other substance, and post-traumatic stress disorder (PTSD) use were also considered as potential covariates.^{65,69,70} However, we chose not to include them in models because substance use and traumatic symptoms may be on the causal pathway between HIV-related stigma and depression,^{71–73} and thus, adjusting for these factors could reduce our ability to detect associations of interest.

Analysis

Participant characteristics were described for the entire sample and compared across study sites using χ^2 test for independence for categorical variables and Kruskal-Wallis test (with ties) for continuous variables. After assessing missingness of scale items (for each scale 93%–98% of participants had no missing items), we used mean imputation to calculate total scores.

To assess whether religiosity, social support, and ethnic identity modified the relationship between HIV-related stigma and depression, we conducted three separate moderation analyses using linear regression models with interactions between HIV-related stigma and each moderator of interest. Models were adjusted for study site, age, time since diagnosis, and education. Estimates of main effects and interaction terms were reported with 95% confidence intervals (CI). For statistically significant moderators, we also predicted and plotted estimates of the association between HIV-related stigma and depression for the 25th, 50th, and 75th percentile values of the moderator for each site. To generate predicted estimates from the regression models, covariates were set to defined values. We chose to set age and time since diagnosis at medians because medians are less susceptible to bias on account of skew than means. Education was set at the most common category (the mode) so that estimates would be most relevant to the largest subgroup of women in the sample. For all regression analyses, Wald tests were used to test for statistical significance ($\alpha = 0.05$). All analyses were conducted using Stata statistical software, v.13.⁷⁴

RESULTS

Among the 239 women consented into the Unity Study, 95% ($n = 226$) met inclusion criteria. No significant differences were identified between women who were and were not included in this analysis ($p > 0.05$). Table 1 describes characteristics of women included in the present study, overall and by site. The median age was 46 years (interquartile range (IQR) = [40–54]), and the majority (63%) had at least a high school education.

The median HIV-related stigma (SSCI) score was 30.15 (IQR = [22,41]); all but 9 participants reported experiencing at least some level of HIV-related stigma (SSCI > 14). Median PHQ-8 score was 6 (IQR = [2–12]), with 67% of women reporting minimal to mild depression, 15% reporting moderate depression, and 18% reporting moderately severe to severe depression.⁵⁷ The median religiosity (RBB) score was 30 (IQR = [22,41]), with 3% of women identifying as atheist, agnostic or unsure, 28% of women identifying as spiritual,

and 69% of women identifying as religious. The median social support (MOS-SSS subscales) score was 3 (IQR = [2–4]), and the median ethnic identity (MEIM-R commitment subscale) score was 4 (IQR = [3–5]).

Women were similar across study sites in terms of years living with HIV, depressive symptom severity, social support, and attachment and belonging to one's ethnic identity ($p < 0.05$). Compared to the Ruth M. Rothstein CORE Center (CORE, $N = 82$) and University of Alabama, Birmingham, (UAB, $N = 102$), participants from Northwestern University (NU, $N = 42$) tended to be younger ($p < 0.001$). Conversely, participants from CORE had less education ($p < 0.001$) and higher HIV-related stigma scores ($p = 0.04$) when compared to participants from other two sites. Religiosity scores were generally higher among participants from UAB ($p = 0.04$).

Table 2 provides estimates from the three moderation analyses. While greater levels of HIV-related stigma were associated with greater depression in all three models ($p < 0.05$), only religiosity significantly modified the association between HIV-related stigma and depression ($p = 0.04$). Higher religiosity was associated with a weaker association between HIV-related stigma and depression. Specifically, for each 1-unit higher religiosity score, the association between HIV-related stigma and severity of depressive symptoms was 0.01 units smaller ($\beta = -0.01$, 95% CI: $-0.01, -0.0004$). Predicted estimates of the association between HIV-related stigma and depression at different levels of religiosity are presented by site in Figure 1. For all sites, the magnitude of the association between HIV-related stigma and depression decreased with increased religiosity.

To better understand aspects of religiosity that may influence the association between HIV-related stigma and depression, we conducted post-hoc analyses investigating specific religious behaviors as measured by individual items of the RBB. In regression analyses, the relationship between HIV-related stigma and depression was moderated by frequency of prayer ($p = 0.03$) and attending worship services ($p = 0.04$, Table 3). Specifically, for women who more frequently prayed or attended worship services, the association between HIV-related stigma and depression was weaker than for those who prayed ($\beta = -0.04$, 95% CI: $-0.08, -0.01$) or attended worship services ($\beta = -0.03$, 95% CI: $-0.05, -0.001$) less frequently. In this sample, 96% of women reported praying at least once a day and 53% reported attending worship service at least weekly. Figure 2 compares the predicted association between HIV-related stigma and depression for rare (item = 1) versus almost daily (item = 6) prayer and worship attendance.

DISCUSSION

In this cross-sectional analysis of a recruited sample of African-American women living with HIV, higher levels of HIV-related stigma were consistently associated with greater depression, providing further evidence that HIV-related stigma is a risk factor for poor psychosocial outcomes among this population. Of the three potential resilience resources assessed, religiosity appeared to buffer this association. Higher levels of religiosity were associated with a weaker association between HIV-related stigma and depressive symptoms. Post hoc analyses indicated that frequency of prayer and attending worship services may be

particularly influential. Conversely, neither social support nor ethnic identity influenced the association between HIV-related stigma and depression.

Our finding that religiosity buffered the association between HIV-related stigma and depression is consistent with myriad qualitative studies of African-American women living with HIV. Specifically, aspects of religion and spirituality are frequently cited as both sources of support and mechanisms for coping.^{16,29,75,76} Findings are also consistent with Chaudoir et al's (2012) study of racially diverse men and women living with HIV in Alabama, in which spiritual peace buffered the effects of HIV-related stigma on depression.⁷⁷ Though spiritual peace may be considered distinct from religiosity as measured in the current study, the similar trends highlight the therapeutic potential for religion and spirituality-related resilience resources in the context of HIV-related stigma.

Looking at the individual items of the religiosity measure, our results suggest that attending worship services may be key in buffering the effects of HIV-related stigma in this population. Worship services often provide opportunities for social interaction and community engagement in addition to spiritual guidance,⁷⁸ and the power of religious attendance has been established.⁷⁹ In a longitudinal study in Northern California, Strawbridge et al. found that weekly religious attendance was associated with positive physical, mental and social outcomes.⁸⁰ As our findings indicate that worship attendance occurs frequently in this population, there is clear opportunity for faith-based organizations to leverage the benefits of religious attendance by integrating interventions for African-American women living with HIV into programming.

Indeed, the health promoting effects of religion and spirituality among African-Americans have encouraged many faith-based organizations to engage in HIV prevention activities.⁸¹ Similarly, multiple interventions have attempted to decrease HIV-related stigma among African-American church congregants.^{82–84} However, faith-based programming developed specifically for PLWH (not just those at risk) is far less common, and no interventions have been tested among African-American women with HIV to our knowledge.

One potential explanation for the dearth of faith-based programs for PLWH is, in fact, HIV-related stigma. Historically, faith-based organizations have struggled to address aspects of the HIV epidemic that seemed contrary to their religious teachings (e.g., same sex relationships, sex work and drug use), making them vulnerable to stigmatizing the disease itself.³⁹ A study of religiosity and HIV-related stigma in African-American women revealed complex relationships between religiosity, knowledge of HIV, and different types of stigma, with respondents reiterating that faith-based organizations can play positive and negative roles.⁸⁵ Moreover, in a study of African-American church congregants in South Carolina, higher HIV-related stigma was associated with less enthusiasm for involvement in HIV-related activities.⁸⁶ That is, faith-based organizations have the potential to both mitigate and propagate HIV-related stigma.³²

Traditionally associated with the African-American community, the Protestant “Black Church” continues to play a predominate role in promoting community health and well-being among African Americans.⁸⁷ As such, the Black Church is an obvious choice when

considering faith-based organizations to implement interventions for African-American women living with HIV. Still, approximately 30% of African Americans identify with other Christian denominations and 3% identify with non-Christian faiths (18% are unaffiliated).⁸⁸ This diversity in religious affiliation emphasizes the need to consider a variety of faith-based organizations when developing interventions for this population. Moreover, because different denominations (and different congregations) may have unique historical contexts and cultural characteristics as they related to HIV and HIV-related stigma,⁸⁹ planning and implementation must be mindful and will likely require stigma reduction efforts at the organizational and/or community level.

Alternatively, some African-American women living with HIV may benefit more from interventions that support their personal spiritual practices.²⁹ Results from our study support this option – prayer buffered the association between HIV-related stigma and depression. This finding is in line with a recent review of observational studies, not HIV-specific, which reported consistent associations between prayer and better mental health outcomes.⁹⁰ This finding is also consistent with a study that showed African-American women endorse prayer as a coping strategy for mental illness.⁹¹ Moreover, our study indicates that prayer is extremely common among African-American women living with HIV; the vast majority of women in our sample prayed more than once a day. This high frequency of prayer underscores the potential for this specific religious behavior to be utilized in interventions among this population.

Regarding other possible resilience resources, social support and ethnic identity did not buffer the association between HIV-related stigma and depression in this sample. Similarly, social support did not moderate associations between HIV-related stigma and psychosocial outcomes in studies conducted among persons with HIV in South Africa and Canada.^{70,92} Breet et al. (2014) hypothesized that their null findings were a result of other factors countering the protective effects of social support.⁷⁰ Given the multiple forms of disadvantage facing many African-American women living with HIV (e.g., racism, sexism, poverty), this explanation may be applicable to the present study. For example, perhaps social support has the potential to alleviate the effects of HIV-related stigma, but the chronic stress associated with being a Black women prevents it from doing so in this population.⁹³ Competing and negating factors may also explain the fact that ethnic identity did not have a moderating effect. Alternatively, it is possible that the hypothesized pathways tested here are inaccurate. In a study of rural African-American women with HIV, HIV-related stigma mediated the effects of social support on depression, suggesting that social support precedes HIV-related stigma.¹⁹ And in a study of minority women living with HIV in U.S., ethnic identity was associated with lower stress and this was mediated by social support.⁵⁵ Further work is needed to elucidate the complex relationships between these different phenomena.

Limitations

There are several limitations to this study. First, the analysis was cross-sectional; therefore, we cannot make causal interpretation of any observed associations. Second, self-reported measures may be subject to recall and social desirability bias. Third, based on data availability, we only assessed an overall measure of HIV-related stigma; exploring different

dimensions of HIV-related stigma (e.g. anticipated, perceived, internalized) or including measures of other forms of stigma (e.g., racism and sexism) may provide a more comprehensive understanding of the relationships of interest. Similarly, our measures of religiosity and ethnic identity may have been limited in their ability to differentiate between nuanced religious and ethnic identities in this population. More robust measures which have been validated among African-American women living with HIV may elucidate additional information about these resilience resources. Moreover, we evaluated three constructs hypothesized to promote resilience. Future research should consider other constructs related to resilience (e.g. critical consciousness)⁹⁴ as well as specific measures of resilience among African-American women with HIV. Fourth, we chose not to include substance use or PTSD in our analysis. Given the substantial and complex relationships between substance use and PTSD and HIV,^{95–97} depression,^{69,98,99} social support,^{100–102} and potentially, other resilience resources, further studies are needed to understand the role of these additional factors. Fifth, because all women in this sample were currently receiving HIV care and willing to participate in a randomized controlled trial of a stigma-reduction intervention, the experiences of stigma and depression among these women may not be generalizable to the larger population of African-American women living with HIV. Lastly, while the sample was appropriately powered for Unity Study primary outcomes, we may have had insufficient power to detect moderating effects of interest in the current study.

Conclusions

Despite these limitations, this is the first study to our knowledge to investigate these three resilience resources as potential buffers of the association between HIV-related stigma and depression among African-American women living with HIV. We found that higher HIV-related stigma was associated with higher depression severity, and that this relationship was buffered by religiosity. The protective effects of religiosity, especially worship attendance and prayer, may be leveraged in interventions for African-American women living with HIV who are struggling with HIV-related stigma. HIV-related stigma should be acknowledged and addressed at the community level and among faith-based organizations. Future research is needed to better understand the roles of social support, ethnic identity, other resilience resources, substance use, and PTSD in the lives of African-American women living with HIV.

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Figure 1.
Predicted mean depressive symptom scores (PHQ-8) and 95% confidence intervals across values of HIV-related stigma (SSCI) at different levels of religiosity (RBB) calculated for each study site among a sample of African-American women living with HIV*

Figure 2.

Predicted mean depressive symptom scores (PHQ-8) and 95% confidence intervals across values of HIV-related stigma (SSCI), comparing rare and daily prayer and worship attendance among a sample of African-American women living with HIV*

Table 1.

Baseline characteristics of African-American women living with HIV who participated in an HIV-related stigma-reduction intervention (N = 226)

	NU (N = 42)		CORE (N = 82)		UAB (N = 102)		Total (N = 226)		p-value*
	Median/N	(IQR/%)	Median/N	(IQR/%)	Median/N	(IQR/%)	Median/N	(IQR/%)	
Age (years)	41 years	(31–49)	46 years	(41–54)	50 years	(43–55)	46 years	(40–54)	<0.001
Time since HIV diagnosis (years)	15 years	(11–20)	13 years	(8–18)	15 years	(7–20)	14 years	(9–20)	0.29
Education									<0.001
Less than high school	10	(24%)	44	(54%)	30	(29%)	84	(37%)	
High school or equivalent	10	(24%)	16	(20%)	27	(26%)	53	(23%)	
College	13	(31%)	21	(26%)	36	(35%)	70	(31%)	
More than college	9	(21%)	1	(1%)	9	(9%)	19	(8%)	
HIV-related stigma (SSCI)	29	(22–37)	35	(24–45)	30	(22–37)	30	(22–41)	0.04
Depressive symptom severity (PHQ-8)	5	(2–13)	6	(2–14)	6	(3–11)	6	(2–12)	0.78
Religiosity score (RBB)	33	(25–38)	32	(25–39)	36	(29–40)	34	(27–39)	0.04
Social Support score (MOS-SSS subscales)	3	(2–4)	3	(2–4)	3	(2–4)	3	(2–4)	0.96
Ethnic Identity score (MEIM-R subscale)	4	(3–5)	4	(3–5)	4	(3–5)	4	(3–5)	0.95

NU – Northwestern University, CORE – Ruth M. Rothstein CORE Center, UAB – University of Alabama, Birmingham

IQR – Interquartile range

* p-values refer to χ^2 test for independence for categorical variables and Kruskal-Wallis test (with ties) for continuous variables

SSCI – 14-item Stigma Scale for Chronic Illness

PHQ-8 – 8-item Patient Health Questionnaire

RBB – 7-item Religious Beliefs and Behaviors survey

MOS-SSS subscales – Medical Outcomes Study Social Support Survey Emotional/Informational Support and Positive Social Interaction subscales

MEIM-R subscale – Multigroup

Table 2.

Estimated associations between HIV-related stigma (SSCI) and depression (PHQ-8) and main and moderating effects of religiosity (RBB), social support (MOS-SSS subscales) and ethnic identity (MEIM-R subscale) among a sample of African-American women living with HIV

Predictors/moderators of interest	β^*	(95% CI)	p-value
RELIGIOSITY (RBB)			
HIV-related stigma (main effect)	0.46	(0.27, 0.66)	<0.001
Religiosity (main effect)	0.14	(-0.07, 0.34)	0.20
HIV-related stigma x religiosity	-0.01	(-0.01, -0.0004)	0.04
SOCIAL SUPPORT (MOS-SSS subscales)			
HIV-related stigma (main effect)	0.33	(0.19, 0.46)	<0.001
Social support (main effect)	0.47	(-1.18, 2.12)	0.58
HIV-related stigma x social support	-0.03	(-0.08, 0.02)	0.20
ETHNIC IDENTITY (MEIM-R subscale)			
HIV-related stigma (main effect)	0.22	(0.02, 0.42)	0.03
Ethnic identity (main effect)	-0.56	(-2.42, 1.30)	0.56
HIV-related stigma x ethnic identity	0.01	(-0.04, 0.06)	0.70

* Adjusted for study site, age, time since HIV diagnosis and education

SSCI – 14-item Stigma Scale for Chronic Illness

PHQ-8 – 8-item Patient Health Questionnaire

RBB – 7-item Religious Beliefs and Behaviors survey

MOS-SSS subscales – Medical Outcomes Study Social Support Survey Emotional/Informational Support and Positive Social Interaction subscales

MEIM-R subscale – Multigroup Ethnic Identity Measure Commitment subscale

Table 3.

Estimated main and moderating effects of individual RBB scale items on the association between HIV-related stigma (SSCI) and depression (PHQ-8) among a sample of African-American women living with HIV

Individual items of RBB Scale*	β^{**}	(95% CI)	p-value
How often have you <u>thought about God</u> ?			
Main effect	0.27	(-1.45, 2.00)	0.76
Interaction with HIV-related stigma	0.01	(-0.05, 0.06)	0.84
How often have you <u>prayed</u> ?			
Main effect	1.13	(-0.23, 2.49)	0.10
Interaction with HIV-related stigma	-0.04	(-0.08, -0.01)	0.03
How often have you <u>meditated</u> ?			
Main effect	0.28	(-0.47, 0.01)	0.17
Interaction with HIV-related stigma	-0.01	(-0.03, 0.01)	0.17
How often have you <u>attended a worship service</u> ?			
Main effect	0.35	(-0.51, 1.21)	0.42
Interaction with HIV-related stigma	-0.03	(-0.05, -0.001)	0.04
How often have you <u>read scriptures or holy writings</u> ?			
Main effect	0.21	(-0.58, 1.01)	0.60
Interaction with HIV-related stigma	-0.01	(-0.03, 0.01)	0.31
How often have you had <u>direct experiences with God</u> ?			
Main effect	0.36	(-0.19, 1.43)	0.13
Interaction with HIV-related stigma	-0.02	(-0.04, 0.002)	0.08

* Questions regarding frequency of religious behavior refer to the past 6 months

** Adjusted for study site, age, time since HIV diagnosis and education

SSCI – 14-item Stigma Scale for Chronic Illness

PHQ-8 – 8-item Patient Health Questionnaire

RBB – 7-item Religious Beliefs and Behaviors survey