Working Title: Interaction of religion/spirituality with internalized HIV stigma, depression, alcohol use, and sexual risk among Black men who have sex with men: The six city HPTN 061 study

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Background: Black men who have sex with men (BMSM) remain at highest risk for HIV in the United States. Internalized HIV stigma and depression contribute to substance use and condomless anal intercourse (CAI). Believing in religion and/or spirituality (R/S) is shown to be associated with decreased risk behaviors for some groups, but its impact among BMSM is uncertain. We investigated the main and moderating roles of R/S on pathways from HIV stigma to CAI while under the influence of drugs.

Methods: We used baseline data from 1511 BMSM participants from the HIV Prevention Trials Network (HPTN) 061 study to examine the main associations among spiritual activities and beliefs, religious attendance, and internalized HIV stigma on the pathways from depression to alcohol use to CAI while under the influence of drugs, adjusting for covariates in generalized structural equation models. We tested whether R/S moderated the association between (1) internalized HIV stigma and depression, (2) depression and alcohol use, and (3) alcohol use and CAI while under the influence of drugs.

Results: Spiritual beliefs ($F[1,2]=9.99$, $p<0.001$), spiritual activities ($F[1,2]=9.99$, $p<0.001$), and religious attendance ($F[1,2]=9.99$, $p<0.001$) moderated the pathway between internalized HIV stigma and depression. For example, as internalized HIV stigma increased, those with lower spiritual activity scores experienced significantly higher increases in depression compared to those with higher spiritual activity scores whose symptom scores remained unchanged (Stigma*spiritual activities $B=-0.18$ [SE=0.07], $p<0.001$).

Conclusions: Interventions that aim to reduce CAI among BMSM may consider incorporating religious and/or spiritual activities to reduce internalized HIV stigma and depressive symptoms.

1. Introduction

In the United States (U.S.), Black men who have sex with men (BMSM) remain disproportionately affected by HIV (Centers for Disease Control and Prevention, 2019; Kaiser Family Foundation, 2018). If current HIV incidence rates persist, half of all BMSM will be diagnosed with HIV over their lifetime, compared with 9.1% (1 in 11) of White MSM (Centers for Disease Control and Prevention, 2019b). Condomless anal intercourse (CAI), often under the influence of drugs or alcohol, is a primary risk factor for the transmission and acquisition of HIV among MSM (Beyrer et al., 2012; Hess et al., 2017; Millett et al., 2012). Individual psychosocial and behavioral factors shown to be associated with CAI while under the influence of drugs include: internalized HIV stigma, depression, and alcohol and drug use (Melendez-Torres and Bourne, 2016; Wilson et al., 2014). Little is known, however, about how these factors are associated with one another, which could enhance our understanding of the causal mechanisms behind CAI. Past studies have also focused largely on white MSM. As a result, less is known about the ways in which internalized HIV stigma, depression and substance use contribute to CAI among BMSM, or about potential protective factors that may be uniquely salient to BMSM, such as religiosity and/or spirituality (R/S). In the current study, we tested whether R/S modified hypothesized positive associations between internalized HIV stigma, depression, and alcohol use on CAI while under the influence of drugs in a large sample of BMSM. Investigating these associations is critical for understanding and ultimately reducing racial disparities in HIV incidence among MSM.

1.1. Internalized HIV stigma and depression

Internalized HIV stigma is the endorsement of the negative beliefs associated with HIV and application of these beliefs to oneself, which leads to a devalued sense of being (Pantelic et al., 2019; Visser et al., 2008). Previous research shows that BMSM experience greater internalized HIV stigma compared with other MSM (Jeffries et al., 2015; Overstreet et al., 2013). This disparity may be due to BMSM experiencing multiple forms of stigma as a result of their intersecting social identities (e.g., black, male, and gay) (Overstreet et al., 2013; Bowleg et al., 2012). Syndemic theory posits that internalized HIV stigma is a social-structural determinant that is co-morbid or clusters with mental health and substance use disorders to increase HIV risk (Tsuyuki et al., 2017). Minority stress theory posits that MSM may engage in HIV risk behaviors (e.g., CAI while under the influence of drugs) to cope with the stress caused by internalized HIV stigma and related syndemics (e.g., depression) (Meyer and Frost, 2013; Overstreet et al., 2013). Previous studies with BMSM suggest that these HIV risk behaviors may be more pronounced when no other forms of positive coping are available in their immediate environment (Han et al., 2015; Jackson et al., 2010). Thus, it is important to examine how internalized HIV stigma may heighten BMSM's vulnerability to HIV.

1.2. Alcohol, drug use, and sexual risks

Alcohol and drug use before or during sex increases the risk of HIV transmission through disinhibition in reasoning, higher arousal, and greater behavioral risk taking (e.g., CAI) (Kalichman et al., 2007; Leigh and Stall, 1993; MacDonald et al., 2000; Morgan et al., 2016). Among HIV-infected individuals, heavy alcohol and drug use contributes to disengagement in HIV care and disrupts immune and inflammatory responses that can undermine efforts towards viral suppression (Bagby et al., 2015; Milloy et al., 2012; Williams et al., 2018). The resulting higher viral load increases the risk of HIV transmission by HIV-infected individuals thereby increasing transmission rates in the population (Das et al., 2010; Mugavero et al., 2012). Evidence also shows that for MSM, increased alcohol and drug use is associated with CAI, with accompanying increased sexually transmitted infection (STI) and HIV infections (Kahler et al., 2015; Melendez-Torres and Bourne, 2016). However, the majority of literature on substance use

and HIV among MSM has focused on White MSM (Morgan et al., 2016). To identify interventions to reduce racial disparities in HIV prevention and care, studies are needed that examine the antecedents of CAI while under the influence of drugs among BMSM.

1.3. Religiosity and/or Spirituality (R/S)

Black Americans in the U.S, including those who identify as MSM, have greater religiosity and spiritual engagement compared to their counterparts of other races (Ackah et al., 2018; Garofalo et al., 2015; Taylor et al., 2014). Religiosity is defined here as an organized system of rituals, beliefs, and lifestyles (Geertz, 2008), which focuses more on the external and organizational aspects of R/S and is often measured using indicators such as religious service attendance and affiliation. Spirituality, by contrast, is a broader, more internal concept that characterizes positive well-being and subjective experiences either connected to theological or sacred beliefs (Zinnbauer et al., 1997) or based on one's own essence of self (Stewart, 1997). R/S is associated with lower risk of stigma, depression, sexual risk behaviors, and drug and alcohol use (Drabble et al., 2016; Holt et al., 2018; Mason and Windle, 2002), although findings on the strength and direction of these associations for BMSM are mixed (Moscati and Mezuk, 2014; Nelson, 2009; Watkins et al., 2016) and complex (Nunn et al., 2012; Ransome et al., 2018). With respect to religiosity, several studies document that BMSM experience homonegativity and HIV-related stigma in religious institutions (Dangerfield et al., 2019; Nelson et al., 2017), while other studies suggest that BMSM report better mental and behavioral health outcomes when religious institutions are supportive of same-sex partnerships (Lassiter and Parsons, 2016). With regard to spirituality, MSM report better health outcomes when they engage in more private or internal R/S activities like prayer and meditation (Lassiter and Parsons, 2016), although there remains a paucity of studies among BMSM that examine internal aspects of R/S. We posit that interventions at the individual, spiritual level may be more feasible and effective than those which target the external or organizational aspects of R/S, such as institutional norms. For instance, to experience the health benefits of R/S engagement, including connectedness and a sense of purpose, one may develop their R/S in private or with others who share similar identities and beliefs (Paloutzian and Park, 2013).

1.4 Study aims

In this study, we developed and assessed a theoretical model (Figure 1) based on the theory of religion and health (Chatters, 2000; Koenig et al., 2012; Koenig, 2015), and causal evidence on how internalized HIV stigma influences psychosocial and behavioral risk factors. We propose that internalized HIV stigma is associated with depression (path 1), depression with alcohol use (path 2), and alcohol use with CAI while under the influence of drugs (path 3). We then tested the hypothesis that R/S would have a significant effect modification on each path, specifically that a positive association between internalized HIV stigma and depression will be weaker among BMSM with higher R/S.

2. METHOD

2.1. Participants and procedures

The current study used baseline data from the HIV Prevention Trials Network (HPTN) 061 study. HPTN 061 was a 2-year (July 2009-December 2011) multisite study designed to determine the feasibility and acceptability of a multicomponent HIV prevention program for BMSM (n= 1,553). The study was conducted with a nonprobability sample of BMSM recruited from Atlanta, New York, Boston, Los Angeles, San Francisco, and Washington, D.C. Men were eligible to participate in the study if they were male at birth; identified as Black, African American, Caribbean Black, or multiethnic Black; at least age 18 years or older; and reported at least one episode of CAI with a man in the past six months. BMSM were recruited from the

community or as sexual network partners referred to the study by index participants. Participants used audio computer-assisted self-interview technology to complete a survey that assessed sociodemographics, behaviors, psychosocial factors, and health. All study procedures were approved by the institutional review boards of each clinical research site. More details on study procedures are published elsewhere (Koblin et al., 2013; Mayer et al., 2014).

2.2. Measures

Sociodemographic characteristics included age in years, education, income, and study site. We categorized study site into three main locations: Southeast (Atlanta, GA and Washington, DC), Northeast (Boston, MA and New York, NY) and West (Los Angeles, CA and San Francisco, CA).

HIV status was assessed using a rapid HIV antibody test. Details on the diagnostic methods used to assess HIV status are summarized elsewhere (Koblin et al., 2013; Mayer et al., 2014).

Current religious denomination was captured with a single question, “What is your current religious affiliation”. Responses were combined into six main categories: Baptist, Catholic, Pentecostal, Muslim, other religion, and no affiliation/non-religious.

Internalized HIV stigma was measured with five items such as, “Society looks down on people who have HIV” with responses on a 5-point Likert type scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Scores were summed such that a higher score indicated greater internalized HIV stigma. Cronbach’s alpha for this sample was 0.74 (Sayles et al., 2008).

Depressive symptoms was assessed using the 20 item Center for Epidemiologic Studies Depression Scale (CES-D). A depression score was derived by summing responses for participants who answered at least 19 items. Cronbach’s alpha for this sample was 0.88. Scores were dichotomized such that a score of ≥16 was considered as clinically significant depressive symptoms (Radloff, 1977).

2.2.1. Religiosity/Spirituality

Spiritual beliefs was derived from four related questions: “Meditation/prayer helps me find solutions to my problems”, “Believing in a higher self/God gives meaning to my life”, “Meditation/prayer makes me feel better”, and “Events in my life reflect an overall purpose and plan”. Responses were captured using a 5-point Likert type scale from 1 (Strongly Disagree) to 5 (Strongly Agree). A structural equation measurement model was developed to estimate a spiritual beliefs index score (mean= 0.00, SD= 0.95) in the sample.

Spiritual activities was derived from four related questions: “How often do you do personal meditation or prayer?”, “How often do you read spiritual or metaphysical literature?”, “How often do you talk to others about spiritual concerns?”, and “How often do you consult a spiritual or religious leader?” Response options for these items were: never, occasionally, monthly, weekly, and daily. Following the approach for spiritual beliefs, we estimated a spiritual activities index score (mean= 0.00, SD= 0.92) in the sample.

Religious service attendance was assessed with a single question: “How often do you attend religious or spiritual services?”. Response options were never, holidays, monthly, weekly, and daily. There is some variation in the literature on how to categorize or combine responses to this item. Due to the sample size and distribution of responses, we combined weekly and daily attendance to create a variable with four levels (1= never, 2= holidays, 3= monthly, 4= weekly/daily).

2.2.2. Alcohol use
Alcohol use in the past six months was evaluated in the survey through a single question: “In the last 6 months, how often did you have a drink containing alcohol?”. Response options included never, monthly or less, 2-4 times a month, 2-3 times a week, and 4 or more times a week.

2.2.3. Condomless anal intercourse while under the influence of drugs
CAI while under the influence of drugs was the primary variable of interest and was defined as condomless anal sex (bottom or top sexual position, no condom) with the most recent anal sex partner while under the influence of drugs (defined as drug use within a two-hour period before or during sex).

2.3. Statistical analyses
Frequency distributions for categorical variables and means with standard deviations for continuous variables were used to assess the sociodemographic characteristics of the sample. Bivariate associations were assessed using a Chi-square test or t-test or related non-parametric tests for comparing subjects having and not having CAI while under the influence of drugs on each variable of interest. Next, we tested the associations between internalized HIV stigma, depressive symptoms, alcohol use, and CAI while under the influence of drugs. We then examined the moderation effects of spiritual beliefs, spiritual activities, and religious attendance on each pathway. We conducted the indirect/mediating analysis by fitting generalized structural equation models (GSEM) and included the following covariates: study location, HIV status, age at enrollment, education, marriage status, and household income. We assessed the statistical significance of the main effects at $p<0.05$ and effect modification at $p<0.10$ to detect any evidence of an interaction. Our R/S analysis used secondary data in which detecting interactions often requires between four and 10 times the size as main effect variables (Smith, 1981; Schwartz, 2006). All statistical analyses were conducted in STATA version 14.0.

3. RESULTS

3.1. Descriptive statistics
Table 1 presents the sociodemographic characteristics of the sample. The mean age was 37.8 years (SD= 11.8), most had not completed college (54.8%), and 23.0% were confirmed HIV positive at baseline. Participants were almost evenly distributed in the Southeast (33.2%), Northeast (35.1%), and West (31.8%) geographical regions. Most participants reported being single, divorced, or widowed (88.7%). Most participants identified as Baptist (46.6%) followed by “other religion” (26.2%). Most participants (61.8%) reported drinking alcohol at least 2-4 times a month in the past 6 months. The mean depression score was 16.3 (SD= 11.1) and 44.6% of the participants were above the cut point of 16.0 indicating clinically significant depressive symptoms. The mean internalized HIV stigma score was 15.1 (SD= 4.4) indicating high levels of internalized HIV stigma. The prevalence of BMSM reporting CAI while under the influence of drugs was 25.7%.

3.2. Bivariate analyses
Table 1 presents the bivariate analyses between CAI while under the influence of drugs and sociodemographic and behavioral variables. Compared to respondents who did not report CAI while under the influence of drugs, respondents reporting CAI while under the influence of drugs were more likely to report marijuana use in the past six months ($p<0.001$), had a higher frequency of drinking alcohol ($p<0.001$), were more likely to be unemployed ($p= 0.02$), have a

lower income (p= 0.001), and report more depressive symptoms (p= 0.008). There were no significant differences in HIV status between the two groups (p= 0.16).

3.3. Main effects of hypothesized predictors and CAI while under the influence of drugs
Figure 1 shows the path diagram of the conceptual model for this study. Although not displayed in the figure, covariates such as age, education level, study location, and income were included when fitting the GSEM. Main associations between covariates, internalized HIV stigma, R/S, depression, alcohol use, and CAI while under the influence of drugs are shown in Table 2. We found greater endorsement of spiritual activities to be inversely associated with depressive symptoms (β= -1.65; 95% CI= -2.64, -0.65; *p*= 0.001). Higher internalized HIV stigma was associated with more depressive symptoms (β=0.47; 95% CI= 0.34, 0.60, *p*<0.001). Greater depressive symptoms were associated with higher levels of alcohol use β= 0.01; 95%CI= 0.001, 0.01, *p*= 0.02). Higher levels of alcohol use were associated with an increased likelihood of CAI while under the influence of other drugs β= 0.26; 95%CI= 0.18, 0.34; *p*<0.001).

3.4. Effect Modification by R/S on pathways from internalized HIV stigma to CAI while under the influence of drugs
Spiritual beliefs (F[1,2]= 9.99, *p*<0.001) and activities (F[1,2]= 9.99, *p*<0.001) as well as religious service attendance (F[1,2]= 9.99, *p*<0.001) significantly moderated the pathway between stigma and depressive symptoms only (path 1). The coefficient for the spiritual beliefs by stigma interaction was positive and significant according to our *p*<0.10 criteria. β= 0.13; 95% CI= -0.01, 0.26; *p*= 0.07 (table 3), while the coefficient for spiritual activities by stigma was negative and highly significant β= -0.18; 95% CI= -0.32, -0.05; *p*= 0.01 (table 4). To facilitate interpretation between continuous by continuous interactions we probed the significant findings by plotting predicted depression scores for continuous internalized HIV stigma on risk of depression stratified by multiple discrete values (House, 1983; VanderWeele et al., 2012) of spiritual beliefs and spiritual activities, after adjustment for covariates. For clarity, we displayed discrete values for low beliefs (-1) and high beliefs (2), which we chose from the lower and upper distribution of the scale.

As shown in Figure 2, internalized HIV stigma was positively associated with depression among those reporting both high and low levels of spiritual beliefs, although this relationship was more positive among those reporting high spiritual beliefs (indicated by a slightly steeper slope). Importantly, those with higher spiritual beliefs reported lower depression scores at each level of internalized HIV stigma compared with those with lower spiritual beliefs (lower intercepts). A slightly different pattern was observed with respect to spiritual activities. As illustrated in Figure 3, those with high spiritual activities reported lower depression scores than those with low spiritual activities, and these scores increased at a much lower rate than those with low spiritual activities as internalized HIV stigma increased from 6 to 18. Finally, with respect to religious service attendance, as shown in Figure 4, the association between internalized HIV stigma and depression was weaker among those who attended religious services weekly β= -0.48; 95% CI= -0.81, -0.15; *p*= 0.004 or monthly β= 0.42; 95% CI= -0.79, -0.05; *p*= 0.03, compared with those who never attended religious services (Table 5). However, those who attended service weekly or daily reported higher depression scores across each level of HIV stigma compared with those who never attended service. R/S did not significantly modify the associations in the other paths.

4. DISCUSSION

R/S are important psychosocial coping resources for BMSM (Overstreet et al., 2013; Bowleg et al., 2012). While religious service attendance is a noted source of conflict for BMSM, we instead

focus on spiritual activities and beliefs as another way to engage BMSM to improve adherence and success in ongoing and validated HIV prevention strategies.

Internalized HIV stigma is a significant predictor of risky sexual behaviors, with depression and alcohol use as likely mechanisms for these risks. In this study, we simultaneously modeled the associations among internalized HIV stigma, depression, alcohol use, and CAI while under the influence of drugs. We then tested hypotheses that R/S will moderate the associations between these variables (figure 1) within a large sample of BMSM residing in the U.S. Consistent with other studies, we found that higher internalized HIV stigma was associated with higher depressive symptoms, higher depressive symptoms was associated with higher alcohol use, and higher alcohol use was associated with an increased likelihood of CAI while under the influence of drugs (Kahler et al., 2015; Lee et al., 2002; Melendez-Torres and Bourne, 2016; Tao et al., 2017).

We found that although internalized HIV stigma was associated with higher depression, that effect was lower among people with higher spiritual beliefs. Spiritual beliefs also moderated the path between depression and alcohol use. We found effect modification by R/S was not present at later stages of the model such as between alcohol use and CAI while under the influence of drugs. This finding suggests that R/S may lower engagement in risk behaviors indirectly by disrupting the psychosocial processes (i.e., depression) underlying these behaviors, rather than by altering the substance use or behavioral pathways directly. The majority of the spirituality items in our measure reflected a definition consistent with oneness and striving to better oneself, rather than other measures that often define spirituality in terms of reverence to the sacred. These results suggest that spiritual beliefs may be a likely candidate to include as part of an intervention module in cognitive behavioral therapy based interventions or perhaps developed as a separate intervention to address HIV-related behaviors among BMSM. Potential HIV prevention components could focus on helping MSM identify purpose within themselves that need not be connected to a religious tradition or to sacred beliefs. Such interventions have the potential to reach a wider audience of MSM including those who do not identify with a religious affiliation.

Internalized HIV stigma leads to someone feeling socially devalued and experiencing a diminished self-worth. In contrast, R/S, particularly internal aspects of R/S (i.e., spiritual beliefs and activities) connects people to a sense of wholeness and enables people to view themselves and experiences as part of a larger, meaningful process (Koenig et al., 2012; Lassiter and Parsons, 2016). For BMSM in this study, internalized HIV stigma manifested itself when they believe the negative views that society holds about HIV and people living with HIV. Perhaps, men with greater spirituality are able to replace or challenge negative internalizations with more spiritually positive thoughts about well-being, self-worth, and meaning (Chaudoir et al., 2012). The observed differences in the slopes and intercepts for the R/S interactions indicate that spiritual beliefs and activities may be more effective protective factors than religious service attendance alone. Our findings for the performance of the R/S factors are consistent with other literature on MSM and R/S which shows that even among religious MSM, those with higher spirituality have better mental health outcomes, greater resiliency, and more social support as compared to MSM who were religious but not spiritual (Lassiter and Parsons, 2016).

4.1 Limitations

This study has several limitations. First, the cross sectional nature of these data means that causal inference among the pathways and temporality cannot be established. For example, men experiencing increased alcohol use or alcohol problems may turn away from R/S because of the

religious restrictions and stigma related to alcohol use (Koenig et al., 2012; Witkiewitz et al., 2016). Moreover, our measure of R/S, does not account for how men may internalize religious objections of MSM and whether these internalizations are countered if they choose to participate in a more supportive R/S system (Nelson et al., 2017). Additionally, we hypothesized a sequence of events (see Figure 1); however, we do not have the actual temporal patterns for these occurrences. These nuances have implications for how R/S may influence later paths in our model as well as alcohol use trajectories for BMSM. Second, men were enrolled in the study based on an eligibility requirement of CAI and thus are not representative of all BMSM, but they do represent a high risk subgroup of BMSM to which interventions are needed. Third, we examined a specific set of R/S measures. R/S is a complex experience and may be operationalized through multidimensional constructs (i.e., there may be other R/S variables that operate through specific mechanisms like social support and emotional regulation) (Chatters, 2000; Taggart et al., 2018). R/S beliefs and activities evolve over time and are influenced by secular and non-secular factors (Bowie et al., 2017). Our hypotheses and conclusions were limited to the set of R/S measures that were captured in the original survey. Lastly, we assessed effect modification at $p<.10$ rather than the typical $p<0.05$. One of the interactions we found was at $p<.07$, nevertheless the lower bound of the effect size ($B=0.13$) was -0.01. Interactions may be missed by not having a fully specified model or by not including observed confounders; more often interactions are missed due to sample size. Our results from this interaction test is, therefore, not prescriptive but indicative that future research should examine these mechanisms with a larger sample size. Despite these limitations, our study used robust measures of R/S, focused on the mechanisms undergirding CAI while under the influence of drugs, and used data from one of the largest-ever studies of BMSM in the U.S. We still do not know whether these reported associations hold when assessed using biomarkers for drug and alcohol use; qualitative research is needed to understand how spirituality operates in the context of internalized HIV stigma.

4.2 Conclusions

We used a robust statistical path-analysis approach to examine the associations between internalized HIV stigma, depression, alcohol, and CAI while under the influence of drugs and to investigate potential pathways to intervene with R/S. These results may be valuable in developing strategies to reduce the effect of internalized HIV stigma on depression and contributes to HIV prevention and treatment efforts that aim to reduce alcohol use and CAI. HIV-related intervention strategies that seek to facilitate a sense of meaning, global life purpose, and connectedness to others (van der Heijden et al., 2017) may be particularly well-suited to address the effects of internalized HIV stigma on depression. Moreover, our study further underscores the need to examine more internal manifestations of R/S—versus solely measuring service attendance or affiliation—and how these factors may enhance the effectiveness of existing secular interventions for BMSM in the U.S. BMSM experience more internalized HIV stigma. Identifying prevention strategies to reduce the effect of stigma is important to ending the HIV epidemic and addressing HIV disparities.

References

Ackah, W., Dodson, J.E., Smith, D.R., 2018. Religion, culture and spirituality in African and the African diaspora, Routledge Studies in Religion. Routledge, New York: NY, p. 201.

Bagby, G.J., Amedee, A.M., Siggins, R.W., Molina, P.E., Nelson, S., Veazey, R.S., 2015. Alcohol and HIV effects on the immune system. Alcohol Res 37(2), 287.

Bowie, J., Juon, H.S., Taggart, T., Thorpe, R.J., Ensminger, M., 2017. Predictors of religiosity in a cohort of African Americans. Race Soc Probl 9(1), pp.29-41.

Beyrer, C., Baral, S.D., van Griensven, F., Goodreau, S.M., Chariyalertsak, S., Wirtz, A.L., Brookmeyer, R., 2012. Global epidemiology of HIV infection in men who have sex with men. Lancet 380(9839), 367-377.

Bowleg L, Raj A., 2012. Shared communities, structural contexts, and HIV risk: prioritizing the HIV risk and prevention needs of black heterosexual men. Am J Public Health. 102(52), S173–7.

Centers for Disease Control and Prevention, 2019. HIV and African Americans. http://www.webcitation.org/query?url=https%3A%2F%2Fwww.cdc.gov%2Fhiv%2Fpdf%2Fgroup%2Fracialethnic%2Fafricanamericans%2Fcdc-hiv-africanamericans.pdf&date=2019-05-08. Accessed September 20 2019.

Centers for Disease Control and Prevention, 2019b. HIV among Gay and Bisexual Men. https://www.cdc.gov/hiv/group/msm/index.html. Accessed December 1 2019.

Chatters, L.M., 2000. Religion and health: public health research and practice. Annu Rev Public Health 21, 335-367.

Chaudoir, S.R., Norton, W.E., Earnshaw, V.A., Moneyham, L., Mugavero, M.J., Hiers, K.M., 2012. Coping with HIV stigma: do proactive coping and spiritual peace buffer the effect of stigma on depression? AIDS Behav 16(8), 2382-2391.

Dangerfield, D.T., 2nd, Williams, J.E., Bass, A.S., Wynter, T., Bluthenthal, R.N., 2019. Exploring Religiosity and Spirituality in the Sexual Decision-Making of Black Gay and Bisexual Men. J Relig Health 58(5), 1792-1802.

Das, M., Chu, P.L., Santos, G.-M., Scheer, S., Vittinghoff, E., McFarland, W., Colfax, G.N., 2010. Decreases in community viral load are accompanied by reductions in new HIV infections in San Francisco. PLoS One 5(6), e11068.

Drabble, L., Trocki, K.F., Klinger, J.L., 2016. Religiosity as a protective factor for hazardous drinking and drug use among sexual minority and heterosexual women: Findings from the National Alcohol Survey. Drug Alcohol Depend 161, 127-134.

Garofalo, R., Kuhns, L.M., Hidalgo, M., Gayles, T., Kwon, S., Muldoon, A.L., Mustanski, B., 2015. Impact of religiosity on the sexual risk behaviors of young men who have sex with men. J Sex Res 52(5), 590-598.

Geertz, C., 2008. Religionas a cultural system, in: Lambek, M. (Ed.) A reader in the anthropology of religion. 1966 Blackwell Pub Ldt, Malden, MA pp. 57-76.

Han, C.-s., Ayala, G., Paul, J.P., Boylan, R., Gregorich, S.E., Choi, K.-H., 2015. Stress and coping with racism and their role in sexual risk for HIV among African American, Asian/Pacific Islander, and Latino men who have sex with men. Arch Sex Behav 44(2), 411-420.

Hess, K.L., Hu, X., Lansky, A., Mermin, J., Hall, H.I., 2017. Lifetime risk of a diagnosis of HIV infection in the United States. Ann Epidemiol 27(4), 238-243.

Holt, C.L., Roth, D.L., Huang, J., Clark, E.M., 2018. Role of religious social support in longitudinal relationships between religiosity and health-related outcomes in African Americans. J Behav Med 41(1), 62-73.

House, J. S., 1983. Work stress and social support. Addison-Wesley Longman, Inc., Reading, MA.

Jackson, J.S., Knight, K.M., Rafferty, J.A., 2010. Race and unhealthy behaviors: chronic stress, the HPA axis, and physical and mental health disparities over the life course. Am J Public Health 100(5), 933-939.
Jeffries, W.L.t., Townsend, E.S., Gelaude, D.J., Torrone, E.A., Gasiorowicz, M., Bertolli, J., 2015. HIV stigma experienced by young men who have sex with men (MSM) living with HIV infection. AIDS Educ Prev 27(1), 58-71.
Kahler, C.W., Wray, T.B., Pantalone, D.W., Kruis, R.D., Mastroleo, N.R., Monti, P.M., Mayer, K.H., 2015. Daily associations between alcohol use and unprotected anal sex among heavy drinking HIV-positive men who have sex with men. AIDS Behav 19(3), 422-430.
Kaiser Family Foundation, 2018. Black Americans and HIV/AIDS. http://files.kff.org/attachment/Fact-Sheet-Black-Americans-and-HIV-AIDS-The-Basics. Accessed October 25 2019.
Kalichman, S.C., Simbayi, L.C., Kaufman, M., Cain, D., Jooste, S., 2007. Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. Prev Sci 8(2), 141.
Koblin, B.A., Mayer, K.H., Eshleman, S.H., Wang, L., Mannheimer, S., del Rio, C., Shoptaw, S., Magnus, M., Buchbinder, S., Wilton, L., Liu, T.Y., Cummings, V., Piwowar-Manning, E., Fields, S.D., Griffith, S., Elharrar, V., Wheeler, D., 2013. Correlates of HIV acquisition in a cohort of Black men who have sex with men in the United States: HIV prevention trials network (HPTN) 061. PLoS One 8(7), e70413.
Koenig, H.G., King, D., Carson, V.B., 2012. Handbook of religion and health. Oxford University Press, Oxford, England.
Koenig, H.G., 2015. Religion, spirituality, and health: a review and update. Adv Mind Body Med 29(3), 19-26.
Lassiter, J.M., Parsons, J.T., 2016. Religion and Spirituality's Influences on HIV Syndemics Among MSM: A Systematic Review and Conceptual Model. AIDS Behav 20(2), 461-472.
Lee, R.S., Kochman, A., Sikkema, K.J., 2002. Internalized stigma among people living with HIV-AIDS. AIDS Behav 6(4), 309-319.
Leigh, B.C., Stall, R., 1993. Substance use and risky sexual behavior for exposure to HIV. Issues in methodology, interpretation, and prevention. Am Psychol 48(10), 1035-1045.
MacDonald, T.K., MacDonald, G., Zanna, M.P., Fong, G., 2000. Alcohol, sexual arousal, and intentions to use condoms in young men: applying alcohol myopia theory to risky sexual behavior. Health Psychol 19(3), 290.
Mason, W.A., Windle, M., 2002. A longitudinal study of the effects of religiosity on adolescent alcohol use and alcohol-related problems. J Adolesc Res 17(4), 346-363.
Mayer, K.H., Wang, L., Koblin, B., Mannheimer, S., Magnus, M., del Rio, C., Buchbinder, S., Wilton, L., Cummings, V., Watson, C.C., Piwowar-Manning, E., Gaydos, C., Eshleman, S.H., Clarke, W., Liu, T.Y., Mao, C., Griffith, S., Wheeler, D., 2014. Concomitant socioeconomic, behavioral, and biological factors associated with the disproportionate HIV infection burden among Black men who have sex with men in 6 U.S. cities. PLoS One 9(1), e87298.
Melendez-Torres, G.J., Bourne, A., 2016. Illicit drug use and its association with sexual risk behaviour among MSM: more questions than answers? Curr Opin Infect Dis 29(1), 58-63.
Meyer, I.H., Frost, D.M., 2013. Minority stress and the health of sexual minorities, Handbook of psychology and sexual orientation. Oxford University Press, New York, NY, US, pp. 252-266.
Millett, G.A., Jeffries , W.L., Peterson, J.L., Malebranche, D.J., Lane, T., Flores, S.A., Fenton, K.A., Wilson, P.A., Steiner, R., Heilig, C.M., 2012. Common roots: a contextual review of HIV epidemics in black men who have sex with men across the African diaspora. Lancet 380(9839), 411-423.

Milloy, M.J., Montaner, J., Wood, E., 2012. Barriers to HIV treatment among people who use injection drugs: implications for 'treatment as prevention'. Curr Opin HIV AIDS 7(4), 332-338.

Morgan, E., Skaathun, B., Michaels, S., Young, L., Khanna, A., Friedman, S.R., Davis, B., Pitrak, D., Schneider, J., 2016. Marijuana Use as a Sex-Drug is Associated with HIV Risk Among Black MSM and Their Network. AIDS Behav 20(3), 600-607.

Moscati, A., Mezuk, B., 2014. Losing faith and finding religion: Religiosity over the life course and substance use and abuse. Drug Alcohol Depend 136, 127-134.

Mugavero, M.J., Amico, K.R., Westfall, A.O., Crane, H.M., Zinski, A., Willig, J.H., Dombrowski, J.C., Norton, W.E., Raper, J.L., Kitahata, M.M., 2012. Early retention in HIV care and viral load suppression: implications for a test and treat approach to HIV prevention. J Acquir Immune Defic Synd 59(1), 86-93.

Nelson, J.M., 2009. Religion, Spirituality, and Mental Health, in: Nelson, J.M. (Ed.) Psychology, religion and spirituality. Springer Science and Business Media LLC, New York, NY, pp. 347-390.

Nelson, L.E., Wilton, L., Zhang, N., Regan, R., Thach, C.T., Dyer, T.V., Kushwaha, S., Sanders, R.E.C., 2nd, Ndoye, O., Mayer, K.H., 2017. Childhood exposure to religions with high prevalence of members who discourage homosexuality is associated with adult HIV risk behaviors and HIV infection in black men who have sex with men. Am J Mens Health 11(5), 1309-1321.

Nunn, A., Cornwall, A., Chute, N., Sanders, J., Thomas, G., James, G., Lally, M., Trooskin, S., Flanigan, T., 2012. Keeping the faith: African American faith leaders' perspectives and recommendations for reducing racial disparities in HIV/AIDS infection. PLoS One 7(5), e36172.

Overstreet, N.M., Earnshaw, V.A., Kalichman, S.C., Quinn, D.M., 2013. Internalized stigma and HIV status disclosure among HIV-positive black men who have sex with men. AIDS Care 25(4), 466-471.

Paloutzian, R.F., Park, C.L., 2013. Handbook of the psychology of religion and spirituality, 2nd ed. The Guilford Press, New York, NY, US.

Pantelic, M., Sprague, L., Stangl, A.L., 2019. It's not "all in your head": critical knowledge gaps on internalized HIV stigma and a call for integrating social and structural conceptualizations. BMC Infect Dis 19(1), 210.

Radloff, L.S., 1977. The CES-D scale: A self-report depression scale for research in the general population. Appl Psychol Meas 1(3), 385-401.

Ransome, Y., Bogart, L.M., Nunn, A.S., Mayer, K.H., Sadler, K.R., Ojikutu, B.O., 2018. Faith leaders' messaging is essential to enhance HIV prevention among Black Americans: results from the 2016 National Survey on HIV in the Black Community (NSHBC). BMC Pub Health 18, 1392.

Sayles, J.N., Hays, R.D., Sarkisian, C.A., Mahajan, A.P., Spritzer, K.L., Cunningham, W.E., 2008. Development and psychometric assessment of a multidimensional measure of internalized HIV stigma in a sample of HIV-positive adults. AIDS Behav 12(5), 748-758.

Schwartz, S., 2006. Modern epidemiologic approaches to interaction: applications to the study of genetic interactions. In *Genes, behavior, and the social environment: Moving beyond the nature/nurture debate*. National Academies Press, Washington, DC.

Smith, P.G. and Day, N.E., 1984. The design of case-control studies: the influence of confounding and interaction effects. Int J Epid, 13(3), 356-365.

Stewart, C.F., 1997. Soul survivors: An African American spirituality. Westminster John Knox Press, Louisville, KY.

Taggart, T., Gottfredson, N., Powell, W., Ennett, S., Chatters, L. M., Carter-Edwards, L., Eng, E, 2018. The role of religious socialization and religiosity in African American and Caribbean Black adolescents' sexual initiation. J Relig Health 57(5), 1889-1904.

Tao, J., Wang, L., Kipp, A.M., et al., 2017. Relationship of stigma and depression among newly HIV-diagnosed Chinese men who have sex with men. AIDS Behav 21(1), 292-299.
Taylor, R.J., Chatters, L.M., Brown, R.K., 2014. African American religious participation. Rev Relig Res 56(4), 513-538.
Tsuyuki, K., Pitpitan, E.V., Levi-Minzi, M.A., Urada, L.A., Kurtz, S.P., Stockman, J.K., Surratt, H.L., 2017. Substance use disorders, violence, mental health, and HIV: differentiating a syndemic factor by gender and sexuality. AIDS Behav 21(8), 2270-2282.
van der Heijden, I., Abrahams, N., Sinclair, D., 2017. Psychosocial group interventions to improve psychological well-being in adults living with HIV. Cochrane Libr(3).
VanderWeele, T.J. and Knol, M.J., 2014. A tutorial on interaction. Epidemiologic Methods, 3(1), 33-72.
Visser, M.J., Kershaw, T., Makin, J.D., Forsyth, B.W., 2008. Development of parallel scales to measure HIV-related stigma. AIDS Behav 12(5), 759-771.
Watkins, T.L., Jr., Simpson, C., Cofield, S.S., Davies, S., Kohler, C., Usdan, S., 2016. The Relationship of Religiosity, Spirituality, Substance Abuse, and Depression Among Black Men Who Have Sex with Men (MSM). J Relig Health 55(1), 255-268.
Williams, E.C., McGinnis, K.A., Bobb, J.F., Rubinsky, A.D., Lapham, G.T., Skanderson, M., Catz, S.L., Bensley, K.M., Richards, J.E., Bryant, K.J., 2018. Changes in alcohol use associated with changes in HIV disease severity over time: A national longitudinal study in the Veterans Aging Cohort. Drug Alcohol Depend 189, 21-29.
Wilson, P.A., Stadler, G., Boone, M.R., Bolger, N., 2014. Fluctuations in depression and well-being are associated with sexual risk episodes among HIV-positive men. Health Psychol 33(7), 681-685.
Witkiewitz, K., McCallion, E., Kirouac, M., 2016. Religious affiliation and spiritual practices: an examination of the role of spirituality in alcohol use and alcohol use disorder. Alcohol Res 38(1), 55.
Zinnbauer, B.J., Pargament, K.I., Cole, B., Rye, M.S., Butter, E.M., Belavich, T.G., Hipp, K.M., Scott, A.B., Kadar, J.L., 1997. Religion and spirituality: unfuzzying the fuzzy. J Sci Study Relig 36(4), 549-564.

TABLES AND FIGURES

Table 1. Demographic Characteristics of HPTN 061 Study Participants with Condomless Anal Intercourse (CAI) under the Influence of Drugs (N=1511)

Variable	Total (n=1511) N (%)	Had CAI[a] (n=388) N (%)	χ^2 /t-value	P-value[b]
Age at enrollment (Mean, SD)	37.8, 11.8	41.2, 10.5	-6.68	<0.001*
Education			4.16	0.04*
Less than college	828 (54.8)	230 (59.3)		
Greater than high school	682 (45.2)	158 (40.7)		
Income			13.8	0.001*
<$9,999	573 (38.3)	169 (43.6)		
$10,000-49,999	753 (50.3)	193 (49.7)		
>$50,000	170 (11.4)	26 (6.7)		
Employment status			5.56	0.02*
Working currently	465 (30.8)	101 (26.0)		
Not working currently	1045 (69.2)	287 (74.0)		
Marital status			0.04	0.84
Married, have primary partner	171 (11.3)	45 (11.6)		
Single, divorced, widowed	1339 (88.7)	343 (88.4)		
Sexual orientation			23.4	<0.001*
Homosexual/Gay	516 (34.8)	99 (25.9)		
Exclusively bisexual	424 (28.6)	140 (36.7)		
Other	545 (36.7)	143 (37.4)		
Identify as transgender	31 (2.05)	6 (1.55)	0.66	0.42
HIV status			2.00	0.16
HIV-	1164 (77.0)	309 (79.6)		
HIV+	347 (23.0)	79 (20.4)		
Location			14.6	0.001*
Southeast	501 (33.2)	99 (25.5)		
Northeast	530 (35.1)	158 (40.7)		
West	480 (31.8)	131 (33.8)		
Alcohol drinking frequency			58.5	<0.001*
Never	319 (21.37)	50 (13.1)		
Monthly or less	251 (16.81)	57 (14.9)		
2-4 times a month	366 (24.51)	86 (22.5)		
2-3 times a week	320 (21.43)	87 (22.7)		
4 or more times a week	237 (15.87)	103 (26.9)		
Marijuana use in the last 6 months	821 (55.85)	295 (78.5)	104.7	<0.001*
Stigma (Mean, SD)	15.1, 4.4	15.2, 4.3	-0.55	0.58
Depression (Mean, SD)	16.3, 11.1	18.1, 10.8	7.06	0.008*
Low risk (<16)	774 (55.4)	180 (49.5)		
High risk (≥16)	623 (44.6)	184 (50.6)		
Current Religion			4.47	0.48
Baptist	306 (46.6)	77 (51.7)		
Catholic	42 (6.4)	8 (5.4)		
Pentecostal	71 (10.8)	18 (12.1)		
Muslim	21 (3.2)	5 (3.4)		
Other	172 (26.2)	30 (20.1)		
No affiliation/non-religious	45 (6.9)	11 (7.4)		
Spiritual beliefs (Mean, SD)	-0.0004, 0.95	-0.0005, 0.90	0.003	1.00
Spiritual activities (Mean, SD)	-0.001, 0.92	-0.008, 0.86	0.17	0.87
Religious attendance			8.02	0.05*
Never	401 (27.0)	108 (28.3)		
Holidays	274 (18.5)	63 (16.5)		
Monthly	353 (23.8)	108 (28.3)		
Weekly/Daily	455 (30.7)	103 (27.0)		

a. CAI is defined as having condomless anal intercourse (bottom/top position, no condom) with the most recent anal sex partner while under the influence of drugs.
b. P-value from Chi-square test or t-test comparing respondents having CAI and not having CAI.

Figure 1: Conceptual Model/Path Diagram

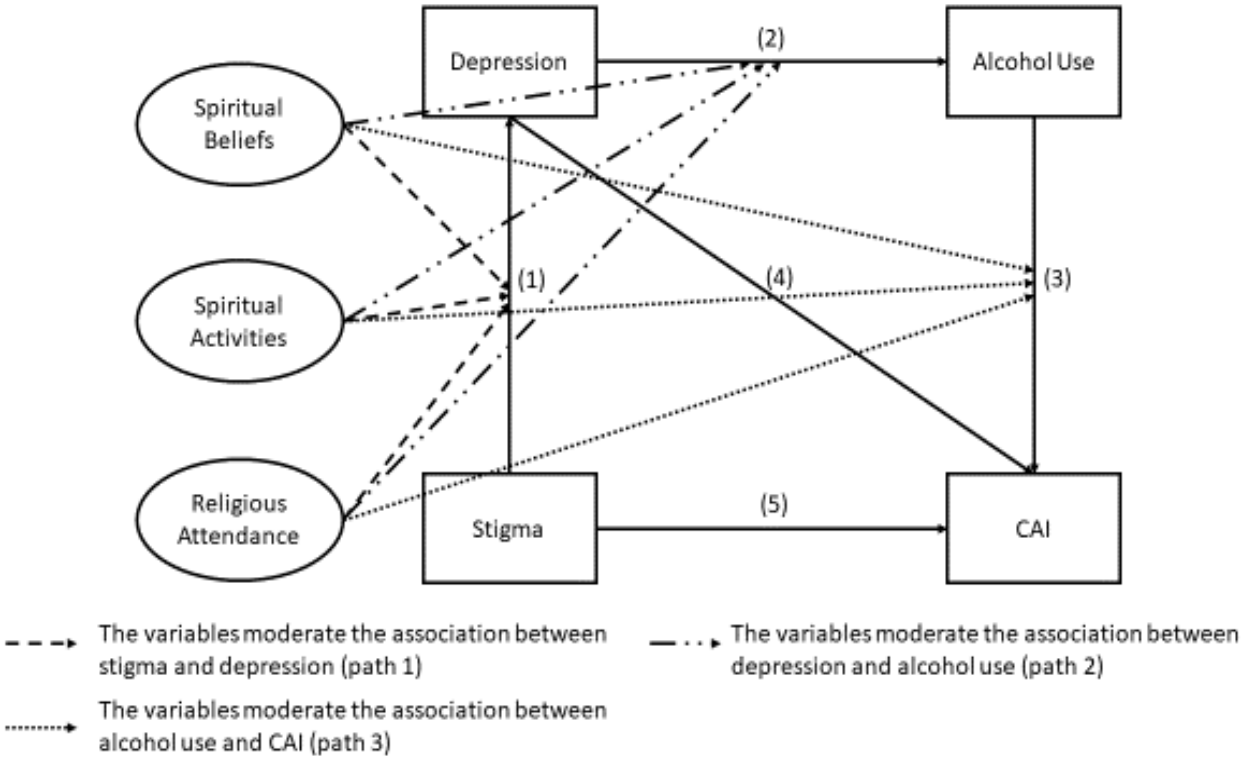

Table 2. Main Associations between Religious and Other Factors and Depressive Symptoms, Alcohol Use, and CAI under the Influence of Drugs

Path Coefficients	Estimate [95%CI]	SE	P-value
DV: Depression			
Stigma	0.47 [0.34, 0.60]	0.07	<0.001*
Spiritual activities	-1.65 [-2.64, -0.65]	0.51	0.001*
Spiritual beliefs	-0.76 [-1.63, 0.10]	0.44	0.08
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.10 [-1.67, 1.88]	0.91	0.91
Monthly	0.34 [-1.41, 2.09]	0.89	0.70
Weekly/Daily	0.65 [-1.20, 2.51]	0.95	0.49
Intercept	8.89 [6.51, 11.27]	1.21	<0.001*
DV: Alcohol Use			
Depression	0.01 [0.001, 0.01]	0.003	0.02*
Spiritual activities	0.003 [-0.12, 0.13]	0.06	0.96
Spiritual beliefs	0.08 [-0.02, 0.19]	0.06	0.13
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.14 [-0.08, 0.36]	0.11	0.23
Monthly	0.08 [-0.13, 0.30]	0.11	0.45
Weekly/Daily	-0.22 [-0.45, 0.02]	0.12	0.07
Intercept	2.84 [2.65, 3.02]	0.09	<0.001*
DV: CAI			
Stigma	0.02 [-0.01, 0.04]	0.01	0.20
Depression	0.01 [-0.003, 0.02]	0.005	0.16
Alcohol use	0.26 [0.18, 0.34]	0.04	<0.001*
Spiritual activities	-0.01 [-0.19, 0.18]	0.09	0.93
Spiritual beliefs	-0.02 [-0.18, 0.14]	0.08	0.77
Religious attendance			
Never	Reference	Reference	Reference
Holidays	-0.24 [-0.57, 0.09]	0.17	0.15
Monthly	0.09 [-0.21, 0.40]	0.15	0.55
Weekly/Daily	-0.18 [-0.53, 0.17]	0.18	0.31
Location			
Southeast	Reference	Reference	Reference
Northeast	0.39 [0.12, 0.66]	0.14	0.01*
West	0.31 [0.02, 0.59]	0.14	0.03*
Age at enrollment	0.03 [0.02, 0.04]	0.005	<0.001*
Income			
<$9,999	Reference	Reference	Reference
$10,000–$49,999	-0.19 [-0.41, 0.02]	0.11	0.08
>$50,000	-0.58 [-1.03, -0.12]	0.23	0.01*
Intercept	-3.63 [-4.36, -2.90]	0.37	<0.001*
Depression variance	117.26 [108.83, 126.34]	4.46	
Alcohol use variance	1.82 [1.69, 1.96]	0.07	
Akaike crit. (AIC)	16864.40		
Bayesian crit. (BIC)	17021.32		

Table 3. Spiritual Beliefs Moderate the Association between Internalized HIV Stigma and Depressive Symptoms among Black MSM in the HPTN 061 Cohort

Path Coefficients	Estimate [95%CI]	SE	P-value
DV: Depression			
Spiritual activities	-1.66 [-2.65, -0.67]	0.51	0.001*
Spiritual beliefs	-2.70 [-4.95, -0.44]	1.15	0.02*
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.17 [-1.61, 1.94]	0.91	0.85
Monthly	0.37 [-1.38, 2.11]	0.89	0.68
Weekly/Daily	0.70 [-1.16, 2.56]	0.95	0.46
Stigma	0.48 [0.35, 0.62]	0.07	<0.001*
Spiritual beliefs *Stigma	0.13 [-0.01, 0.26]	0.07	0.07
Intercept	8.65 [6.27, 11.04]	1.22	<0.001*
DV: Alcohol Use			
Spiritual activities	0.01 [-0.12, 0.13]	0.06	0.93
Spiritual beliefs	0.11 [-0.04, 0.27]	0.08	0.14
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.13 [-0.09, 0.36]	0.11	0.23
Monthly	0.08 [-0.14, 0.30]	0.11	0.46
Weekly/Daily	-0.22 [-0.45, 0.01]	0.12	0.06
Depression	0.01 [0.001, 0.01]	0.003	0.02*
Spiritual beliefs *Depression	-0.002 [-0.01, 0.005]	0.003	0.59
Intercept	2.84 [2.65, 3.03]	0.10	<0.001*
DV: CAI			
Spiritual activities	-0.001 [-0.19, 0.18]	0.09	0.99
Spiritual beliefs	0.05 [-0.27, 0.36]	0.16	0.78
Alcohol use	0.25 [0.18, 0.33]	0.04	<0.001*
Religious attendance			
Never	Reference	Reference	Reference
Holidays	-0.26 [-0.59, 0.08]	0.17	0.13
Monthly	0.08 [-0.22, 0.39]	0.15	0.59
Weekly/Daily	-0.19 [-0.54, 0.16]	0.18	0.28
Spiritual beliefs *Alcohol use	-0.02 [-0.10, 0.06]	0.04	0.65
Stigma	0.02 [-0.01, 0.04]	0.01	0.15
Depression	0.01 [-0.003, 0.02]	0.005	0.18
Location			
Southeast	Reference	Reference	Reference
Northeast	0.39 [0.12, 0.66]	0.14	0.01*
West	0.31 [0.03, 0.60]	0.14	0.03*
HIV status			
HIV-	Reference	Reference	Reference
HIV+	-0.07 [-0.33, 0.18]	0.13	0.57
Age at enrollment	0.03 [0.02, 0.04]	0.005	<0.001*
Education			
Less than college	Reference	Reference	Reference
Greater than high school	-0.13 [-0.35, 0.09]	0.11	0.25
Marriage status			
Single, divorced, widowed	Reference	Reference	Reference
Married, have primary partner	0.03 [-0.29, 0.36]	0.17	0.84
Income			
<$9,999	Reference	Reference	Reference
$10,000–$49,999	-0.17 [-0.39, 0.05]	0.11	0.13
>$50,000	-0.52 [-0.99, -0.05]	0.24	0.03*
Intercept	-3.60 [-4.33, -2.87]	0.37	<0.001*
Depression variance	116.98 [108.57, 126.04]	4.45	
Alcohol use variance	1.82 [1.69, 1.96]	0.07	
Akaike crit. (AIC)	16869.79		
Bayesian crit. (BIC)	17058.09		

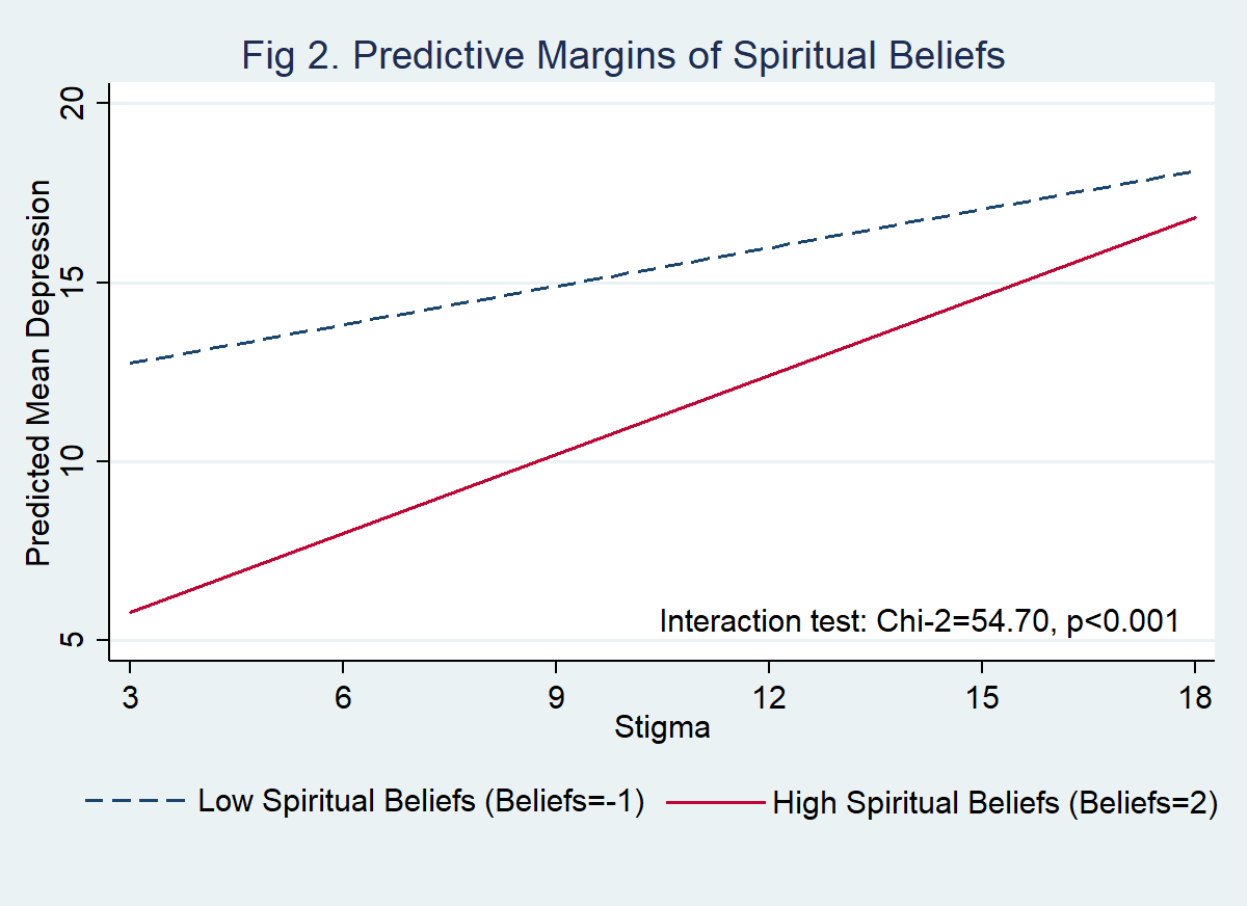
Fig 2. Predictive Margins of Spiritual Beliefs
Predicted Mean Depression
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Stigma
Interaction test: Chi-2=54.70, p<0.001
Low Spiritual Beliefs (Beliefs=-1)
High Spiritual Beliefs (Beliefs=2)

Table 4. Spiritual Activities Moderates the Association between Internalized HIV Stigma and Depressive Symptoms among Black MSM in the HPTN 061 Cohort

Path Coefficients	Estimate [95%CI]	SE	P-value
DV: Depression			
Stigma	0.47 [0.34, 0.60]	0.07	<0.001*
Spiritual activities	1.07 [-1.13, 3.28]	1.13	0.34
Spiritual beliefs	-0.85 [-1.71, 0.02]	0.44	0.06
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.16 [-1.61, 1.93]	0.90	0.86
Monthly	0.38 [-1.36, 2.12]	0.89	0.67
Weekly/Daily	0.68 [-1.17, 2.53]	0.95	0.47
Spiritual activities *Stigma	-0.18 [-0.32, -0.05]	0.07	0.01*
Intercept	8.83 [6.46, 11.20]	1.21	<0.001*
DV: Alcohol Use			
Depression	0.01 [0.001, 0.01]	0.003	0.02*
Spiritual activities	-0.02 [-0.19, 0.15]	0.09	0.80
Spiritual beliefs	0.08 [-0.03, 0.19]	0.06	0.13
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.14 [-0.09, 0.36]	0.11	0.23
Monthly	0.08 [-0.14, 0.30]	0.11	0.46
Weekly/Daily	-0.22 [-0.45, 0.01]	0.12	0.07
Spiritual activities *Depression	0.001 [-0.01, 0.01]	0.003	0.66
Intercept	2.84 [2.65, 3.02]	0.10	<0.001*
DV: CAI			
Stigma	0.02 [-0.01, 0.04]	0.01	0.13
Depression	0.01 [-0.003, 0.02]	0.005	0.19
Alcohol use	0.26 [0.18, 0.33]	0.04	<0.001*
Spiritual activities	-0.22 [-0.55, 0.10]	0.17	0.18
Spiritual beliefs	-0.02 [-0.17, 0.14]	0.08	0.85
Religious attendance			
Never	Reference	Reference	Reference
Holidays	-0.26 [-0.59, 0.07]	0.17	0.12
Monthly	0.08 [-0.22, 0.39]	0.15	0.59
Weekly/Daily	-0.19 [-0.54, 0.16]	0.18	0.28
Spiritual activities *Alcohol use	0.07 [-0.01, 0.15]	0.04	0.10
Location			
Southeast	Reference	Reference	Reference
Northeast	0.39 [0.12, 0.66]	0.14	0.01*
West	0.32 [0.04, 0.60]	0.14	0.03*
HIV status			
HIV-	Reference	Reference	Reference
HIV+	-0.07 [-0.33, 0.18]	0.13	0.57
Age at enrollment	0.03 [0.02, 0.04]	0.005	<0.001*
Education			
Less than college	Reference	Reference	Reference
Greater than high school	-0.13 [-0.35, 0.09]	0.11	0.26
Marriage status			
Single, divorced, widowed	Reference	Reference	Reference
Married, have primary partner	0.05 [-0.28, 0.37]	0.17	0.78
Income			
<$9,999	Reference	Reference	Reference
$10,000–$49,999	-0.17 [-0.39, 0.05]	0.11	0.13
>$50,000	-0.52 [-0.99, -0.05]	0.24	0.03*
Intercept	-3.62 [-4.35, -2.89]	0.37	<0.001*
Depression variance	116.64 [108.26, 125.67]	4.44	
Alcohol use variance	1.82 [1.69, 1.96]	0.07	
Akaike crit. (AIC)	16863.45		
Bayesian crit. (BIC)	17051.75		

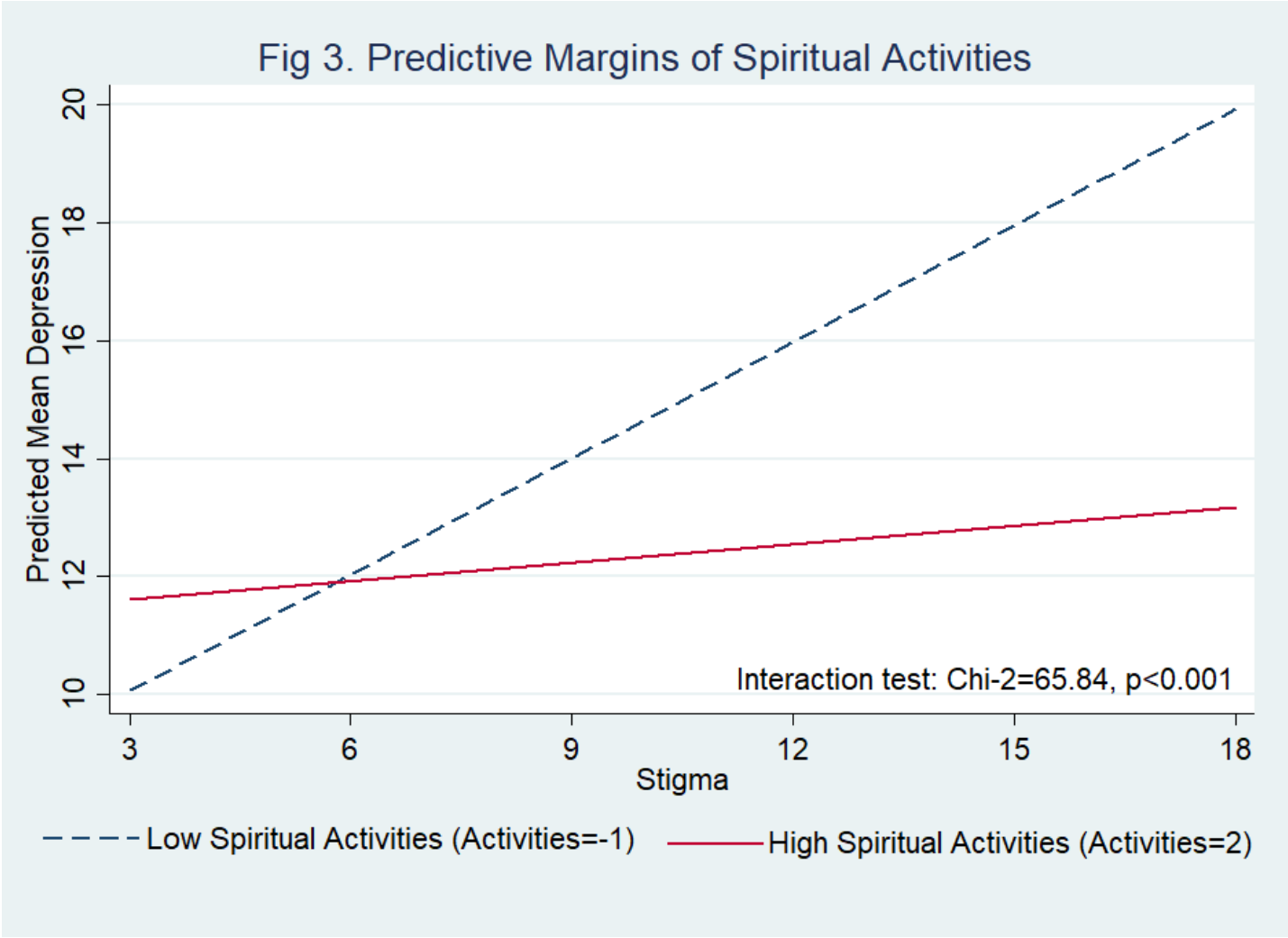
Fig 3. Predictive Margins of Spiritual Activities
Predicted Mean Depression
10
12
14
16
18
20
3
6
9
12
15
18
Stigma
Interaction test: Chi-2=65.84, p<0.001
Low Spiritual Activities (Activities=-1)
High Spiritual Activities (Activities=2)

Table 5. Religious Attendance Moderates the Association between Internalized HIV Stigma and Depressive Symptoms among Black MSM in the HPTN 061 Cohort

Path Coefficients	Estimate [95%CI]	SE	P-value
DV: Depression			
Stigma	0.78 [0.53, 1.02]	0.13	<0.001*
Spiritual activities	-1.69 [-2.68, -0.70]	0.51	0.001*
Spiritual beliefs	-0.83 [-1.70, 0.03]	0.44	0.06
Religious attendance			
Never	Reference	Reference	Reference
Holidays	4.80 [-1.95, 11.55]	3.44	0.16
Monthly	6.72 [0.80, 12.64]	3.02	0.03*
Weekly/Daily	7.97 [2.61, 13.34]	2.74	0.004*
Religious attendance*Stigma			
Never*Stigma	Reference	Reference	Reference
Holidays*Stigma	-0.31 [-0.73, 0.12]	0.22	0.16
Monthly*Stigma	-0.42 [-0.79, -0.05]	0.19	0.03*
Weekly/Daily*Stigma	-0.48 [-0.81, -0.15]	0.17	0.004*
Intercept	4.23 [0.28, 8.19]	2.02	0.04*
DV: Alcohol Use			
Depression	0.01 [-0.00, 0.02]	0.01	0.19
Spiritual activities	0.002 [-0.12, 0.13]	0.06	0.97
Spiritual beliefs	0.08 [-0.02, 0.19]	0.06	0.13
Religious attendance			
Never	Reference	Reference	Reference
Holidays	0.08 [-0.30, 0.47]	0.20	0.68
Monthly	-0.03 [-0.41, 0.34]	0.19	0.86
Weekly/Daily	-0.12 [-0.47, 0.23]	0.18	0.51
Religious attendance*Depression			
Never*Depression	Reference	Reference	Reference
Holidays*Depression	0.003 [-0.02, 0.02]	0.01	0.74
Monthly*Depression	0.01 [-0.01, 0.03]	0.01	0.44
Weekly/Daily*Depression	-0.01 [-0.02, 0.01]	0.01	0.45
Intercept	2.84 [2.60, 3.08]	0.12	<0.001*
DV: CAI			
Stigma	0.02 [-0.01, 0.04]	0.01	0.19
Depression	0.01 [-0.002, 0.02]	0.005	0.14
Alcohol use	0.22 [0.08, 0.36]	0.07	0.002*
Spiritual activities	-0.002 [-0.19, 0.18]	0.09	0.98
Spiritual beliefs	-0.02 [-0.18, 0.14]	0.08	0.83
Religious attendance			
Never	Reference	Reference	Reference
Holidays	-0.35 [-1.28, 0.58]	0.47	0.46
Monthly	0.20 [-0.53, 0.93]	0.37	0.59
Weekly/Daily	-0.68 [-1.44, 0.09]	0.39	0.08
Religious attendance*Alcohol use			
Never*Alcohol use	Reference	Reference	Reference
Holidays*Alcohol use	0.03 [-0.22, 0.28]	0.13	0.82
Monthly*Alcohol use	-0.03 [-0.23, 0.16]	0.10	0.74
Weekly/Daily*Alcohol use	0.15 [-0.06, 0.35]	0.10	0.15
Location			
Southeast	Reference	Reference	Reference
Northeast	0.40 [0.12, 0.67]	0.14	0.004*
West	0.32 [0.04, 0.61]	0.15	0.03*
HIV status			
HIV-	Reference	Reference	Reference
HIV+	-0.08 [-0.33, 0.18]	0.13	0.56
Age at enrollment	0.03 [0.02, 0.04]	0.005	<0.001*
Education			
Less than college	Reference	Reference	Reference
Greater than high school	-0.12 [-0.34, 0.10]	0.11	0.28
Marriage status			

Single, divorced, widowed	Reference	Reference	Reference
Married, have primary partner	0.03 [-0.30, 0.35]	0.17	0.88
Income			
<$9,999	Reference	Reference	Reference
$10,000–$49,999	-0.16 [-0.39, 0.06]	0.11	0.14
>$50,000	-0.50 [-0.98, -0.03]	0.24	0.04
Intercept	-3.47 [-4.29, -2.65]	0.42	<0.001*
Depression variance	116.50 [108.13, 125.52]	4.43	
Alcohol use variance	1.81 [1.68, 1.95]	0.07	
Akaike crit. (AIC)	16871.09		
Bayesian crit. (BIC)	17090.78		

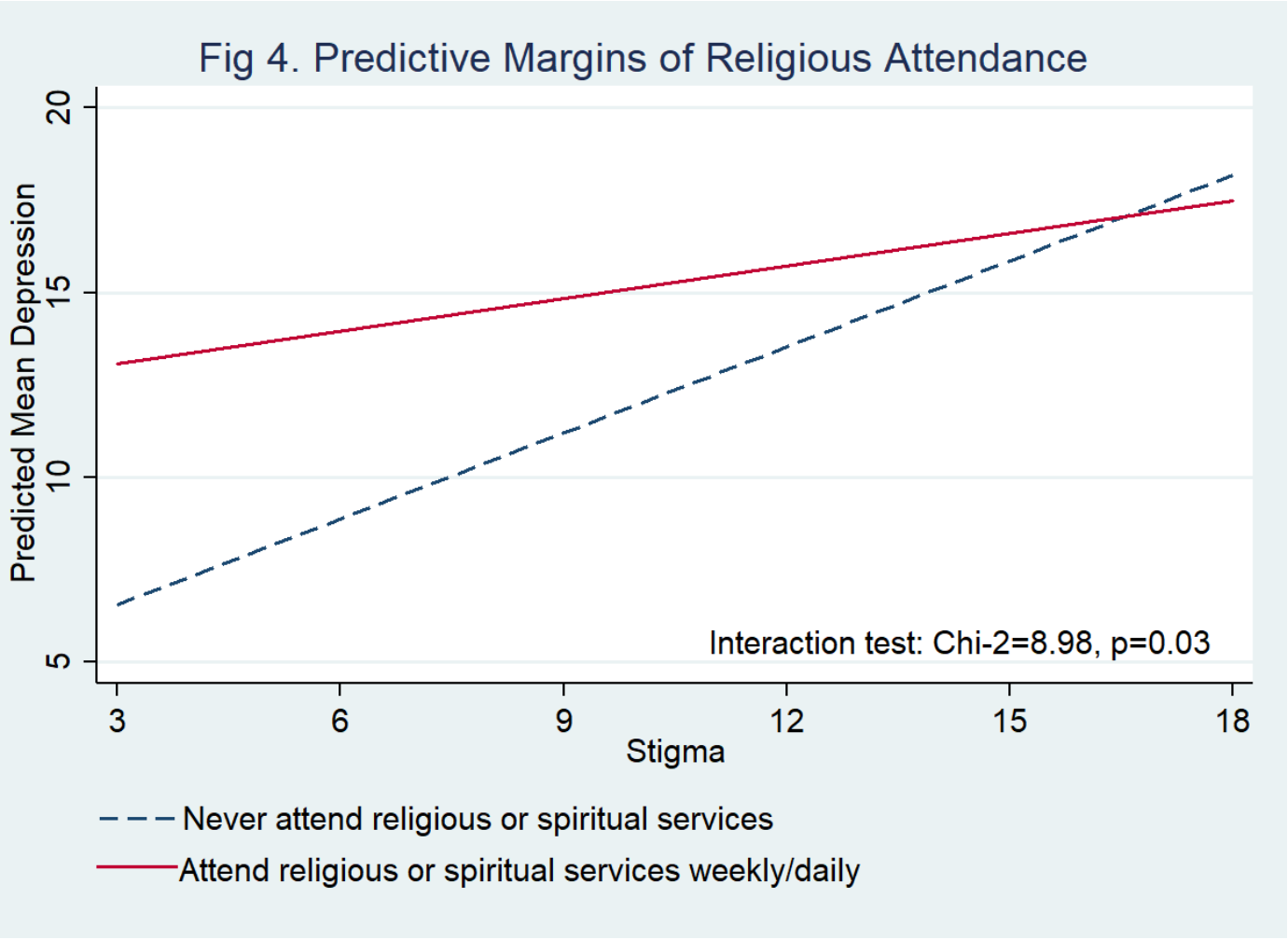
Fig 4. Predictive Margins of Religious Attendance
Predicted Mean Depression
5
10
15
20
3
6
9
12
15
18
Stigma
Interaction test: Chi-2=8.98, p=0.03
Never attend religious or spiritual services
Attend religious or spiritual services weekly/daily