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Patterns of alcohol use and associated characteristics and HIV-related outcomes among a sample of African-American women living with HIV

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DR, SEC, JMT, JMS, MPA, and ALF designed the study. DR, PEN, CGK, SEC, JMT, and ALF coordinated and conducted the data collection. LL and ECW analyzed and interpreted the data. LL and ECW drafted the manuscript. All authors reviewed and provided feedback on early drafts of the manuscript. All authors reviewed and approved the final manuscript.

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Conflict of interest

No conflicts to declare.

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Abstract

Background: Alcohol use is common among people living with HIV and negatively impacts care and outcomes. African-American women living with HIV are subject to vulnerabilities that may increase risk for alcohol use and associated HIV-related outcomes.

Methods: We used baseline data from a randomized controlled trial of an HIV-related stigma-reduction intervention among African-American women living with HIV in Chicago and Birmingham (2013-2015). Patterns of alcohol use [any use, unhealthy alcohol use (UAU), heavy episodic drinking (HED)] were measured using the AUDIT-C. We assessed demographic, social, and clinical characteristics which may influence alcohol use and HIV-related outcomes which may be influenced by patterns of alcohol use in bivariate and multivariable analyses.

Results: Among 220 African-American women living with HIV, 54% reported any alcohol use, 24% reported UAU, and 27% reported HED. In bivariate analysis, greater depressive symptoms, low religiosity, low social support, marijuana, and crack/cocaine use were associated with patterns of alcohol use ($p < 0.05$). Marijuana and cocaine/crack use were associated with patterns of alcohol use in adjusted analysis ($p < 0.05$). In adjusted analysis, any alcohol use and HED were associated with lower likelihood of ART adherence (ARR = 0.72, 95% CI: 0.53-0.97 and ARR = 0.65, 95% CI: 0.44-0.96, respectively), and UAU was associated with lack of viral suppression (ARR = 0.78, 95% CI: 0.63-0.96).

Conclusions: Findings suggest any and unhealthy alcohol use is common and associated with poor HIV-related outcomes in this population. Regular alcohol screening and intervention should be offered, potentially targeted to subgroups (e.g., those with other substance use).

Keywords

African-American women; alcohol use; depression; religiosity; substance use

1. INTRODUCTION

Over 1 million people are living with HIV in the United States (U.S.), and thousands are newly infected each year (CDC, 2017). Ongoing incidence of HIV is largely attributed to social determinants of health and substance use (Fauci et al., 2019). Alcohol use is of key interest because it is highly prevalent among people living with HIV (PLWH) (Williams et al., 2016b), and is associated with increased risk for HIV transmission (Scott-Sheldon et al., 2016), decreased receipt of quality care at every phase of the HIV care continuum (Vagenas

et al., 2015; Williams et al., 2016a; Williams et al., 2018b) and increased risk for complications and mortality (Justice et al., 2016).

For PLWH, no level of alcohol use may be safe (Justice et al., 2016; McGinnis et al., 2016). Furthermore, unhealthy alcohol use (UAU), and particularly, heavy episodic drinking (HED), may be especially dangerous (Williams et al., 2016a). Unhealthy alcohol use refers to a spectrum from drinking above recommended limits to meeting diagnostic criteria for alcohol use disorder (AUD) (Saitz, 2005). Heavy episodic drinking is a type of UAU that increases risk for both short- (e.g., trauma) and long-term (e.g., AUD) alcohol-related consequences (Kuntsche et al., 2017). For PLWH, all levels of UAU are associated with elevated health risks (Justice et al., 2016; Williams et al., 2018b), and alcohol-related consequences generally increase with increasing levels of alcohol use (Rubinsky et al., 2013), which may be worse for women (Matson et al., 2018).

African-American women living with HIV are subject to multiple forms of stigma, stress, and vulnerability — all of which may be associated with increased risk of any and unhealthy alcohol use (Hutton et al., 2017; Williams et al., 2016b). Specifically, African-American women are disproportionately exposed to high levels of psychosocial stressors and structural barriers such as sexism, racism, and poverty (Gilbert and Zemore, 2016; Martin et al., 2003; Mulia et al., 2008). Boyd et al. (2009) hypothesized that African-American women drink alcohol (and use other substances) as a method of coping with these stressors. For African-American women who acquire HIV, the added stress and stigma associated with living with HIV may also influence patterns of alcohol use (Cook et al., 2016; Elliott et al., 2014; Galvan et al., 2002; Warded et al., 2018). Moreover, there may be specific demographic, social, or clinical subgroups of African-American women living with HIV (e.g., older women (Epstein et al., 2007; Williams et al., 2014a), women with greater social support (Peirce et al., 2000), and women with comorbid mental health disorders (Sullivan et al., 2005)) who have higher or lower risk for any and unhealthy alcohol use.

Moreover, research indicates that racial/ethnic minorities, PLWH, and women are at increased risk of alcohol-related consequences (Matson et al., 2018; McGinnis et al., 2016; Mulia et al., 2009; Nolen-Hoeksema, 2004). First, data from a nationally representative alcohol survey demonstrated that African-American and Hispanic drinkers were more likely than White drinkers to report social consequences of drinking, even after adjusting for differences in heavy drinking, and especially at lower levels of drinking. (Mulia et al., 2009) Furthermore, in a study of HIV infected and HIV uninfected men, individuals living with HIV were able to “feel a buzz” with fewer alcoholic drinks. And finally, results from a large national cohort of PLWH suggest that at higher levels of alcohol use, women have worse HIV-related outcomes (e.g., poor ART adherence and higher viral load) than men (Matson et al., 2018).

Despite the potential for elevated levels of any and unhealthy alcohol use among African American women living with HIV, neither prevalence nor correlates of any and unhealthy alcohol use have been described specifically in this population. Similarly, associations between patterns of alcohol use and HIV-related outcomes have also not been studied specifically among African-American women living with HIV (Williams et al., 2016a).

Therefore, the purpose of this study was to 1) describe patterns of alcohol use and associated demographic, social, and clinical characteristics and 2) describe associations between patterns of alcohol use and HIV-related outcomes, in a sample of African-American women living with HIV.

2. MATERIALS AND METHODS

2.1 Data source

This study is a secondary analysis of baseline data from the Unity Study, a randomized controlled trial evaluating the long-term (12 month) effectiveness of an HIV-related stigma-reduction intervention among African-American women living with HIV (Rao et al., 2018). From 2013 to 2015, African-American women living with HIV were recruited from three HIV clinical care sites: Northwestern University Infectious Diseases HIV clinic (NU) and the Ruth M. Rothstein CORE Center (CORE) in Chicago, Illinois and the University of Alabama at Birmingham 1917 HIV Clinic (UAB) in Birmingham, Alabama.

2.2 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 from a participating study clinic (NU, CORE, or UAB). 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 with complete alcohol-related data were included in the current analysis. As ART adherence was a critical correlate of interest, women were excluded if they were not currently prescribed ART or did not provide adherence data.

2.3 Data collection

After providing consent, participants completed baseline assessments via tablet-based audio computer assisted self-interview. Baseline assessments included questions about patterns of alcohol use, demographic, and psychosocial measures. Clinical data were abstracted from medical records.

2.4 Measures

2.4.1 Patterns of alcohol use—We used the Alcohol Use Disorders Identification Test (AUDIT) Consumption (AUDIT-C) alcohol screening questionnaire to characterize three patterns of alcohol use: 1) any alcohol use, 2) any UAU, and 3) any HED. The AUDIT-C is a brief screening tool for UAU (Jonas et al., 2012b), consisting of three items that assess frequency of drinking (How often do you have a drink containing alcohol?), quantity of drinking (How many standard drinks containing alcohol do you have on a typical day?), and frequency of HED (How often do you have 4 or more drinks on one occasion?). Each item is scored 0-4, resulting in a total score ranging from 0 to 12 (Bush et al., 1998), with higher scores indicating higher levels of alcohol-related risk (e.g., consumption, UAU severity, and probability of AUD) (Rubinsky et al., 2013; Williams et al., 2014b) and alcohol-related consequences (e.g. health status, trauma and mortality) (Bradley et al., 2016; Chavez et al., 2012; Williams et al., 2010). Any alcohol use was defined dichotomously (AUDIT-C > 0), UAU was defined dichotomously using a female-specific threshold for UAU (AUDIT-C ≥ 3)

(Bradley et al., 2003) and HED was defined dichotomously using a female-specific threshold (4 drinks) for the third item of the AUDIT-C (item score >0) (Substance Abuse and Mental Health Services Administration (SAMHSA), 2016).

2.4.2 Demographic, social, and clinical characteristics—Three sets of participant characteristics (demographic, social, and clinical) were evaluated based on a review of the alcohol and HIV literature and measures available in the Unity Study (Williams et al., 2016a).

2.4.2.1 Demographic characteristics: Demographic characteristics hypothesized to be associated with patterns of alcohol use in this sample included participant age (continuous), educational level (less than high school, high school or equivalent, or greater than high school), Latina/Hispanic identity (Latina/Hispanic or other), and marital status (married/partnered or other) (Chavez et al., 2015; Curran et al., 1998; Darrow et al., 1992; Epstein et al., 2007; Klein et al., 2016; Okosun et al., 2005; Volk et al., 1996; Williams et al., 2014a).

2.4.2.2 Social characteristics: Social characteristics included characteristics hypothesized to be negatively (HIV-related stigma) or positively (religiosity, social support, and attachment and belonging to one's ethnic identity) associated with patterns of alcohol use (Brome et al., 2000; Cotton et al., 2006; Lehavot et al., 2011; Liao et al., 2014; Mannes et al., 2016; Martin et al., 2003; Mulia et al., 2008; Peirce et al., 2000; Serovich et al., 2001; Vyavaharkar et al., 2010). *HIV-related stigma* was measured continuously using the 14-item Stigma Scale for Chronic Illness (SSCI), a measure validated for use with African Americans living with HIV (Rao et al., 2009; Rao et al., 2016). Referring to the past month, participants respond to statements such as, "Because of my illness, people were unkind to me," on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*always*) resulting in scores from 14 to 70, with higher scores reflecting greater HIV-related stigma. *Religiosity* was measured continuously using the 7-item version of the Religious Beliefs and Behaviors survey (RBB) (Connors et al., 1996; Hawes and Berkley-Patton, 2014). The RBB has demonstrated good internal consistency in an African-American church-based sample (Hawes and Berkley-Patton, 2014). Participants are first asked to select the term that best describes their level of God consciousness from 0 (*atheist*) to 4 (*religious*) and then asked how often they engaged in formal religious activities (e.g., prayer) in the last year. Participants respond using an 8-point Likert-type 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 two subscales (Emotional/Informational Support and Positive Social Interaction) from the Medical Outcomes Study Social Support Survey (MOS-SSS) (Sherbourne and Stewart, 1991). Participants answer questions regarding how often types of social support are available using a 5-point Likert-type scale from 1 (*none of the time*) to 5 (*all of the time*). For this study, an overall support score was calculated by averaging all items from the two subscales. *Attachment and belonging to one's ethnic identity* was measured continuously using the Commitment subscale of the revised Multigroup Ethnic Identity Measure (MEIM-R) (Phinney, 1992; Phinney and Ong, 2007). 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.

2.4.2.3 Clinical characteristics: Clinical characteristics included depressive symptom severity, post-traumatic stress disorder (PTSD), and other substance use, all known to be associated with any and unhealthy alcohol use (Braithwaite et al., 2016; Crane et al., 2017; Hasin et al., 2007; Hoggatt et al., 2015; Jasinski et al., 2000; Korthuis et al., 2012; Sullivan et al., 2005; Sullivan et al., 2011). *Depressive symptom severity* was measured using the 8-item Patient Health Questionnaire (PHQ-8) (Center for quality assessment and improvement in mental health, 1999; Kroenke et al., 2009). Participants answer questions about depressive symptoms in the past two weeks using a 4-point Likert-type scale from 0 (*not at all*) to 3 (*nearly every day*) resulting in scores from 0 to 24 with higher scores reflecting greater severity (based on clinical cut points, 0-4: minimal depression, 5-9: mild depression, 10-14: moderate depression, 15-19: moderately severe depression, 20-24: severe depression). *Symptomatic PTSD* was defined dichotomously as a score >30 on the 17-item PTSD Checklist — Civilian version (PCL-C) (Ruggiero et al., 2003). Participants answer questions about PTSD symptoms in the past month, using a 5-point Likert scale from 1 (*not at all*) to 5 (*extremely*) resulting in scores from 17 to 85. (U.S. Department of Veterans Affairs National Center for Posttraumatic Stress Disorder, 2012) A cut off of >30 is considered appropriate for women (U.S. Department of Veterans Affairs National Center for Posttraumatic Stress Disorder, 2012; Walker et al., 2002; Yeager et al., 2007). *Other substance use* was assessed with two questions generated by Unity Study investigators to preface a longer measure which assesses the severity of an individual's dependence on a given substance (Gossop et al., 1995). Participants were first asked, "Do you use other drugs?" (with "other drugs" left open to the participant's interpretation). Participants who responded affirmatively were then asked the open-ended question, "What is your drug of choice (heroin, cocaine, etc.)?" The responses were categorized as marijuana, cocaine or crack, heroin, or did not specify.

2.4.3 HIV-related outcomes—HIV-related outcomes were selected for evaluation based on prior work and included adherence to ART (100% adherent, < 100% adherent) and viral suppression (Azar et al., 2010; Bryson et al., 2008; Hendershot et al., 2009; Kader et al., 2015; Kalichman et al., 2014; Williams et al., 2016a). We evaluated viral suppression using participants' mean HIV RNA viral load during the 6 months pre- and post-entry into the Unity Study. Viral suppression was defined dichotomously as less than 200 (virally suppressed) vs. 200 or more (not virally suppressed) copies/mL of plasma HIV RNA.

2.5 Analysis

We first summarized participant demographic, social, and clinical characteristics and HIV-related outcomes for the entire analytic sample. Next, to evaluate demographic, social, and clinical characteristics associated with patterns of alcohol use, we compared participant characteristics across groups of women who did and did not report different patterns of alcohol use, testing for differences across groups using χ^2 tests of independence and Kruskal-Wallis tests (with ties) for categorical and continuous variables, respectively. We then estimated the adjusted relative risks (ARR) of patterns of alcohol use associated with participant demographic, social, and clinical characteristics using generalized linear models

with a log link, Poisson distribution, and robust standard errors (Cummings, Peter, 2009). Generalized linear models were used to estimate ARRr instead of logistic regression models, because we anticipated patterns of alcohol use to be common, and odds ratios may overestimate effects when outcomes are common (Cummings, P., 2009). In each model, the alcohol pattern outcome was regressed on all demographic social, and clinical characteristics, as well as study site as an additional covariate.

Similarly, to assess whether patterns of alcohol use were associated with HIV-related outcomes, we first compared patterns of alcohol use across groups based on ART adherence and viral suppression, testing for differences using χ^2 tests of independence. We then fit similar generalized linear models to estimate the relative risk of ART adherence and viral suppression associated with patterns of alcohol use adjusting for demographic, social and clinical characteristics, study site and study arm. We included study arm in this analysis because a small number of participants had viral loads collected after the intervention started, and we hypothesized that participation in a HIV-related stigma reduction intervention could influence alcohol use and severity and viral suppression, thus confounding the observed association.

With our sample, we estimated sufficient power (80%) to detect a difference of 20% in patterns of alcohol use between similarly sized groups based on a 2-arm binomial design with two-sided $\alpha=.05$ tests. The use of covariate modeling to explain additional components of variation increased power for each comparison. We set $\alpha=.05$ with no adjustments for multiple comparisons. Thus, the examination was considered hypothesis-generating, requiring confirmation in independent studies.

3. RESULTS

3.1 Participant characteristics

Of the 239 African-American women living with HIV enrolled in the Unity Study, 220 met inclusion criteria for this analysis; 15 women did not report being prescribed ART and 4 women did not provide adherence data and were excluded. Characteristics of the sample are described in Table 1. The median age was 47 years (interquartile range [IQR] = [40, 54]), a minority (2%) identified as Hispanic/Latina, three-quarters (76%) were unmarried (single/separated/divorced/widowed), and more than half (60%) had at least a high school education.

The median HIV-related stigma (SSCI) score was 30 (IQR = [22,41]), and all but 9 participants reported experiencing at least some level of HIV-related stigma (SSCI > 14). The median religiosity (RBB) score was 34 (IQR = [27,39]), the median social support (MOS-SSS subscales) score was 4 (IQR = [3-5]), and the median ethnic identity (MEIM-R Commitment subscale) score was 4 (IQR = [3-5]). Median PHQ-8 score was 6 (IQR = [2-12]). Based on clinical cut points (Kroenke et al., 2009), 67% of women experienced minimal to mild depressive symptoms, 15% experienced moderate depressive symptoms, and 18% experienced moderately severe to severe depressive symptoms. Symptomatic PTSD was common in this sample (78% met diagnostic criteria), but other substance use was not. Of the 44 women who reported other substance use, 21 women reported that

marijuana was their drug of choice, 13 reported cocaine or crack, 5 reported heroin, and 5 did not specify. Almost 90% of the women in this sample were currently taking ART, about half of whom (49%) reported to be 100% adherent in the past month. Nearly three-quarters of participants (73%) were virally suppressed.

3.2 Patterns of alcohol use and associated characteristics

More than half of participants (54%) reported any alcohol use; 24% screened positive for UAU, and 27% screened positive for HED. Table 2 compares women who did and did not report each of the patterns of alcohol use. Lower religiosity ($p = .04$), higher depressive symptom severity ($p = .03$), and marijuana use ($p < .001$) were more common among women who reported any alcohol use than women who did not. Similarly, lower religiosity ($p = .01$), higher depressive symptom severity ($p < .01$), and cocaine or crack use ($p < .01$) were more common among women who screened positive for UAU compared to those who did not. Finally, higher depressive symptom severity ($p = .03$) and cocaine or crack use ($p = .02$) were more common among women who reported HED than those who did not. In adjusted regression analyses (Table 3), marijuana use was significantly associated with higher likelihood of any alcohol use (adjusted relative risk [ARR] = 1.88, 95% confidence interval [CI] = 1.43, 2.50), UAU (ARR = 2.37, 95% CI: 1.13, 4.97) and HED (ARR = 2.11, 95% CI: 1.09, 4.07). Cocaine or crack use was associated with higher likelihood of UAU (ARR = 2.53, 95% CI: 1.37, 4.67) and HED (ARR = 2.61, 95% CI: 1.40, 4.85).

3.3 Associations between patterns of alcohol use and HIV-related outcomes

Results of both bivariate and multivariable analyses assessing associations between patterns of alcohol use and HIV-related outcomes are presented in Table 4. Any alcohol use ($p < .001$), UAU ($p = .03$) and HED ($p < .01$) were all more common among women who reported suboptimal adherence, and UAU was more common among women who were not virally suppressed ($p = .05$). Similarly, in adjusted regression analyses, any alcohol use and HED were associated with lower likelihood of ART adherence (ARR = 0.72, 95% CI: 0.53, 0.97 and ARR = 0.65, 95% CI: 0.44, 0.96, respectively), but only UAU was significantly associated with lack of viral suppression (ARR = 0.78, 95% CI: 0.63, 0.96).

4. DISCUSSION

In this cross-sectional analysis of a sample of African-American women living with HIV, approximately half reported any alcohol use, a quarter screened positive for UAU, and a quarter reported HED. In bivariate comparisons, social factors hypothesized to be protective (religiosity and social support) were more common among women who did not report any alcohol use, UAU or HED. Clinical factors, specifically depressive symptoms and other substance use were more common among women who reported any alcohol use, UAU or HED than those who did not. After accounting for other factors, only marijuana and cocaine or crack use were associated with patterns of alcohol use. Patterns of alcohol use were associated with sub-optimal ART adherence and lack of viral suppression in both bivariate and multivariable analyses.

To our knowledge, this is the first study to estimate patterns of alcohol use in a sample specifically limited to African-American women living with HIV. Estimates of any and unhealthy alcohol use in this sample were similar to estimates among Black females (Substance Abuse and Mental Health Services Administration (SAMHSA), 2015), PLWH (Williams et al., 2016b), women living with HIV (Crane et al., 2017), and older adults living with HIV (Williams et al., 2014a). While future research using large, diverse samples is needed to estimate the relative risk of any and unhealthy alcohol use associated with being an African-American woman living with HIV, relative to other populations, our results suggest the possibility that despite intersecting vulnerabilities, African-American women living with HIV may not be drinking at elevated levels. Potentially, African-American women living with HIV are practicing resilience via religiosity and social support (Earnshaw et al., 2013). Though patterns of alcohol use were not significantly associated with religiosity and social support in adjusted analysis, bivariate associations were consistent with previous studies demonstrating the protective effects of religiosity and social support among African-American women living with HIV (Grodensky et al., 2015; Himelhoch and Njie-Carr, 2016; Serovich et al., 2001).

Still, our study indicates a substantial number of African-American women living with HIV are reporting any and unhealthy alcohol use, including a slightly more than a quarter reporting HED. Further, our results suggest that African-American women living with HIV reporting these patterns of use may be at increased risk of adverse HIV-related clinical outcomes. Specifically, in adjusted analyses, women reporting any alcohol use or HED (though not the more general measure of UAU) had a lower likelihood of being adherent to ART compared to women who did not, and UAU was associated with lower likelihood of viral suppression, even after adjustment for other factors, including ART adherence. These findings are consistent with studies demonstrating the harmful effects of any and unhealthy alcohol use on HIV care and outcomes, including studies showing associations between alcohol use and HIV disease progression independent of ART adherence (Azar et al., 2010; Cook et al., 2017; Deiss et al., 2016; Lesko et al., 2019; Williams et al., 2018a).

It is unclear why any alcohol use and HED were associated with ART adherence, but UAU was not, and why UAU, but not any alcohol use or HED, was associated with viral suppression. Though one prior longitudinal study of predominately African-American women found that, at baseline, there was no association between heavy drinking (i.e., UAU) and ART adherence (Barai et al., 2017), most prior studies demonstrate a negative relationship between UAU and ART adherence (Hendershot et al., 2009), and many indicate a dose-response association (Braithwaite et al., 2005; Parsons et al., 2008). Further, prior studies have identified associations between any alcohol use and viral suppression (Williams et al., 2019) and high levels of alcohol use (though not specifically HED) and viral suppression (Williams et al., 2016a; Williams et al., 2019). Given the high correlation between ART adherence and viral suppression, it is surprising these outcomes would be differentially associated with specific patterns of unhealthy alcohol use. Findings may relate to limited power to detect associations due to the small sample size and multivariable adjustment or limitations related to the measurement, particularly measures of adherence and unhealthy alcohol use, both of which were based on self-report and could be limited by social desirability bias. Further exploration is needed to better understand associations

between patterns of alcohol use and HIV-related outcomes among African-American women living with HIV.

Regardless, our findings reiterate the need for regular alcohol screening and appropriate interventions for this population (Edelman et al., 2018). While brief alcohol-related interventions have demonstrated success in reducing alcohol use in primary care patients (Jonas et al., 2012a), research indicates that PLWH who screen positive for UAU may be less likely than those without HIV to receive brief alcohol interventions (Williams et al., 2017b). Furthermore, in settings where routinely offered to PLWH, brief interventions may not be having their intended effects (Williams et al., 2017a). Still, a recent review of the literature highlights the potential for adapting existing interventions and integrating alcohol treatment into HIV care (Edelman et al., 2018). Indeed, among a sample of women living with HIV recruited from an urban HIV clinic in Baltimore, a brief intervention adapted for women living with HIV was effective in reducing drinking frequency (Chander et al., 2015). Furthermore, a meta-analysis of behavioral interventions, the majority of which addressed alcohol use as a part of comprehensive HIV-related behavior change, found that interventions were associated with reduced alcohol consumption, improved medication adherence, and decreased viral load (Scott-Sheldon et al., 2017). In combination, these studies suggest that African-American women living with HIV may benefit from targeted brief alcohol interventions integrated into broader HIV-related care initiatives.

The results from this study also indicate that alcohol-related interventions for this population should address other clinical factors (e.g. other substance use and potentially depression). Women who reported any and unhealthy alcohol use had greater depressive symptoms in bivariate analyses and were more likely to use marijuana or cocaine and crack in multivariable analyses when compared to women who did not. Research has repeatedly demonstrated that depression and cocaine use are additional risk factors for poor HIV-related care and outcomes (Baum et al., 2009; Gonzalez et al., 2011; Hartzell et al., 2008; Lesko et al., 2019; Sharpe et al., 2004). The evidence around marijuana use and HIV-related care and outcomes is less clear (Montgomery et al., 2019); as such, the correlation between marijuana use and any and unhealthy alcohol use in this study should be further investigated. Ultimately, treatment options that integrate alcohol treatment with HIV care, mental health services, and other substance treatment may be most effective in yielding positive outcomes for these individuals.

4.1 Limitations

There are several limitations to this study. First, the analysis was cross-sectional and we cannot make causal interpretation of any observed associations. Relatedly, any and unhealthy alcohol use can change over time (Cook et al., 2013; Dawson et al., 2008; Lapham et al., 2014), but patterns of alcohol use were assessed at a single time point. Regular and repeated monitoring over an extended period of time may provide a more accurate and comprehensive assessment of patterns of alcohol use. Second, we had limitations in our measures. Self-reported measures may be subject to recall and social desirability bias. Additionally, other characteristics (e.g., income or employment status) may be associated with alcohol use in this population but were not collected as part of the Unity Study

measures and were therefore absent from our analysis. Also, our measure of other substance use was broad; it is possible that participants interpreted “other drugs” in different ways (e.g., some may have considered tobacco or prescription drug use). Furthermore, we only assessed other substance use as an absolute measure; evaluating frequency and/or severity among substance users may provide more nuanced findings. Third, women in the present study were currently seeking medical care and willing to participate in a study. Thus, the experiences of these women may not be generalizable to the larger population of African-American women living with HIV, many of whom are not in care (CDC, 2019).

5. CONCLUSIONS

In summary, African-American women living with HIV in this study commonly reported any and unhealthy alcohol use. However, qualitative comparison with existing literature suggests that, despite intersecting vulnerabilities, African-American women living with HIV may not have substantially higher prevalence of any alcohol use, UAU, or HED than similar populations (e.g., Black females, PLWH, and older adults living with HIV in the US). These women may be benefiting from resilience resources such as religiosity and social support. Nonetheless, over half of the women in this sample reported any alcohol use, and a quarter each screened positive for UAU and HED, with patterns more common in some subgroups (e.g., women with other substance use). Findings suggest that African-American women living with HIV should be offered regular alcohol screening and intervention. Special attention may be indicated for women who present with, or are at risk for, depression and other substance use, an approach in line with a strategic plan set forth by Fauci et al. (2019) emphasizing the importance of targeting vulnerable populations and simultaneously addressing substance use and mental health disorders as a means of ending HIV in the United States. Future research is needed to investigate longitudinal trends in larger samples of African-American women living with HIV; quantitatively compare patterns of alcohol use among African-American women to other populations, and to clarify the size and directionality of relationships observed in this population. Finally, efforts must be made to develop and test brief interventions that are targeted for African-American women living with HIV and integrated into HIV, mental health, and other substance care.

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Highlights

- Over half of African-American women living with HIV reported any alcohol use
- A quarter reported both unhealthy alcohol use and heavy episodic drinking
- Religiosity and social support were associated with less alcohol use
- Depression and other substance use were associated with greater alcohol use
- Any and unhealthy alcohol use were associated with poor HIV-related outcomes

Table 1.

Baseline characteristics of African-American women living with HIV who participated in an HIV-related stigma-reduction intervention (Unity Study, N = 220)

	N	(%)
Study characteristics		
Study arm		
Control	107	(49%)
Treatment	113	(51%)
Study site		
NU	44	(20%)
CORE	77	(35%)
UAB	99	(45%)
Demographic characteristics		
Age (median years, IQR)	46 years	(40-54 years)
Ethnicity		
Hispanic/Latina	4	(2%)
Not Hispanic/Latina	212	(96%)
Missing	4	(2%)
Marital status		
Single/Separated/Divorced/Widowed	169	(77%)
Married/Partner	50	(23%)
Missing	1	(<1%)
Education		
Less than high school	79	(36%)
High school or equivalent	49	(23%)
More than high school	86	(39%)
Missing	6	(3%)
Social characteristics		
HIV-related stigma (median SSCI, IQR) *	30	(22-41)
Religiosity (median RBB, IQR) *	34	(27-39)
Social support (median MOS-SSS, IQR) *	4.0	(3.1-4.8)
Ethnic identity (median MEIM-R, IQR) *	4.0	(3.3-5.0)
Clinical characteristics		
Depression severity (median PHQ-8, IQR) *	6.0	(2.0-12.0)
Symptomatic PTSD		
Yes	148	(67%)
No	72	(33%)
Other substance use		
Yes	44	(20%)

	N	(%)
No	175	(80%)
Missing	1	(<1%)
Reported substances (N = 44)		
Marijuana	21	(48%)
Cocaine or crack	13	(30%)
Heroin	5	(11%)
Did not specify	5	(11%)
HIV-related clinical characteristics		
ART adherence		
100% adherent	108	(49%)
<100% adherent	112	(51%)
Viral suppression (<200 copies/mL)		
Yes	170	(77%)
No	50	(23%)

* Missing values for participants

NU – Northwestern University, CORE – Ruth M. Rothstein CORE Center, UAB – University of Alabama, Birmingham IQR – Interquartile range, AUDIT-C – Alcohol Use Disorders Identification Test – Consumption

SSCI – 14-item Stigma Scale for Chronic Illness, RBB – 7-item Religious Beliefs and Behaviors survey, MOS-SSS – Medical Outcomes Study Social Support Survey Emotional/Information Support and Positive Social Interaction subscales, MEIM-R – Multigroup Ethnic Identity Measure Commitment subscale, PHQ-8 – 8-item Patient Health Questionnaire PTSD – post-traumatic stress disorder, ART – antiretroviral therapy

Table 2.

Bivariate comparisons of participant characteristics across patterns of alcohol use among a sample of African-American women living with HIV recruited to the Unity Study (N = 220)

	No Alcohol Use (N = 102)		Any Alcohol Use (N = 118)		No Unhealthy Alcohol Use (N = 172)		Any Unhealthy Alcohol Use (N = 48)		No Heavy Episodic Drinking (N = 164)		Any Heavy Episodic Drinking (N = 56)	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Demographic characteristics												
Age (median years, IQR)	46	(40-55)	47	(40-54)	46	(40-55)	46	(37-54)	48	(41-55)	45	(36-54)
Education												
Less than high school	44	(45%)	35	(30%)	61	(36%)	18	(38%)	58	(36%)	21	(38%)
High school or equivalent	20	(20%)	29	(25%)	40	(24%)	9	(19%)	35	(22%)	14	(25%)
More than high school	33	(33%)	53	(45%)	66	(40%)	20	(43%)	66	(42%)	20	(36%)
Hispanic/Latina ethnicity	1	(1%)	3	(3%)	3	(2%)	1	(2%)	2	(1%)	2	(4%)
Marital status												
Single/ Separated/ Divorced/ Widowed	78	(77%)	91	(77%)	132	(77%)	37	(77%)	126	(77%)	43	(77%)
Married/ Partner	23	(23%)	27	(23%)	39	(23%)	11	(23%)	37	(23%)	13	(23%)
Social characteristics												
HIV-related stigma (median SSCI, IQR)	30	(20-43)	32	(24-41)	30	(22-40)	34	(21-43)	30	(22-43)	32	(22-41)
Religiosity (median RBB, IQR)	35	(28-41)	33	(25-39)	34	(28-40)	29	(24-38)	34	(28-40)	32	(24-39)
Social support (median MOS-SSS, IQR)	4.3	(2.8-5.0)	3.9	(3.1-4.5)	4.1	(3.2-4.9)	3.6	(2.9-4.5)	4.2	(3.3-4.9)	3.6	(2.8-4.4)
Ethnic identity (median MEIM-R, IQR)	4.0	(3.3-5.0)	4.0	(3.0-4.7)	4.0	(3.3-5.0)	4.0	(3.3-4.7)	4.0	(3.3-5.0)	4.0	(3.3-4.7)
Clinical characteristics												
Depression (median PHQ-8, IQR)	5.0	(1.0-12.0)	6.0	(4.0-12.0)	6.0	(2.0-12.0)	7.5	(5.5-15.0)	6.0	(2.2-12.0)	6.5	(5.0-11.0)
Symptomatic PTSD	67	(66%)	81	(69%)	111	(65%)	37	(77%)	108	(66%)	40	(71%)
Other substance use												
Marijuana	2	(2%)	19	(16%)	13	(8%)	8	(17%)	12	(7%)	9	(16%)

	No Alcohol Use (N = 102)		Any Alcohol Use (N = 118)		No Unhealthy Alcohol Use (N = 172)		Any Unhealthy Alcohol Use (N = 48)		No Heavy Episodic Drinking (N = 164)		Any Heavy Episodic Drinking (N = 56)	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Cocaine or crack	4	(4%)	9	(8%)	6	(3%)	7	(15%)	6	(4%)	7	(13%)
Heroin	3	(3%)	2	(2%)	5	(3%)	0	(0%)	4	(2%)	1	(2%)

Bold used to indicate p-value <0.05 based on χ^2 test for independence for categorical variables and Kruskal-Wallis test (with ties) for continuous variables, IQR – Interquartile range

SSCI – 14-item Stigma Scale for Chronic Illness, RBB – 7-item Religious Beliefs and Behaviors survey, MOS-SSS – Medical Outcomes Study Social Support Survey Emotional/Information Support and Positive Social Interaction subscales, MEIM-R – Multigroup Ethnic Identity Measure Commitment subscale, PHQ-8 – 8-item Patient Health Questionnaire, PTSD – post-traumatic stress disorder

Table 3.

Estimated adjusted associations between demographic, social, and clinical characteristics and patterns of alcohol use among African-American women living with HIV recruited to the Unity Study (N = 197) *

	Any Alcohol Use		Unhealthy Alcohol Use		Any Heavy Episodic Drinking	
	ARR	(95% CI)	ARR	(95% CI)	ARR	(95% CI)
Demographic characteristics						
Age (years)	1.01	(1.00 – 1.02)	1.01	(0.98 – 1.04)	1.00	(0.98 – 1.02)
Education						
Less than high school	REF	-	REF	-	REF	-
High school or equivalent	1.07	(0.75 – 1.54)	0.79	(0.36 – 1.72)	0.79	(0.39 – 1.60)
More than high school	1.25	(0.90 – 1.74)	1.07	(0.56 – 2.04)	0.87	(0.49 – 1.55)
Hispanic/Latina ethnicity	1.13	(0.62 – 2.06)	0.90	(0.16 – 5.22)	1.31	(0.41 – 4.14)
Marital status						
Single/Separated/Divorced/Widowed	REF	-	REF	-	REF	-
Married/Partner	0.95	(0.69 – 1.31)	1.05	(0.57 – 1.91)	0.99	(0.56 – 1.75)
Social characteristics						
HIV-related stigma (SSCI, IQR)	1.00	(0.99 – 1.01)	0.98	(0.95 – 1.01)	0.98	(0.96 – 1.01)
Religiosity (mean RBB, IQR)	0.99	(0.97 – 1.00)	0.97	(0.94 – 1.01)	0.99	(0.96 – 1.02)
Social support (MOS-SSS, IQR)	1.03	(0.90 – 1.17)	0.93	(0.72 – 1.19)	0.84	(0.67 – 1.05)
Ethnic identity (MEIM-R, IQR)	1.06	(0.91 – 1.23)	1.03	(0.79 – 1.34)	0.99	(0.76 – 1.30)
Clinical characteristics						
Depression (PHQ-8, IQR)	1.03	(1.00 – 1.05)	1.04	(0.98 – 1.10)	1.03	(0.98 – 1.09)
Symptomatic PTSD	0.95	(0.68 – 1.33)	1.64	(0.84 – 3.20)	1.18	(0.61 – 2.27)
Other substance use						
Marijuana	1.88	(1.43 – 2.50)	2.37	(1.13 – 4.97)	2.11	(1.09 – 4.07)
Cocaine or crack	1.45	(0.96 – 2.18)	2.53	(1.37 – 4.67)	2.61	(1.40 – 4.85)
Heroin	1.17	(0.22 – 6.08)	**	**	1.75	(0.26 – 11.68)

Bold used to indicate $p < 0.05$, ARR – adjusted relative risk, models adjusted for study site

* Individuals without complete covariate data were dropped from the multivariable analysis

** Heroin and crack use perfectly predicted no unhealthy alcohol use and were dropped from the model

SSCI – 14-item Stigma Scale for Chronic Illness, RBB – 7-item Religious Beliefs and Behaviors survey, MOS-SSS – Medical Outcomes Study Social Support Survey Emotional/Information Support and Positive Social Interaction subscales, MEIM-R – Multigroup Ethnic Identity Measure Commitment subscale, PHQ-8 – 8-item Patient Health Questionnaire, PTSD – post-traumatic stress disorder

Table 4.

Bivariate and multivariable associations between patterns of alcohol use and HIV-related outcomes (ART adherence and viral suppression) among a sample of African-American women living with HIV recruited to the Unity Study (N = 220) *

	ART Adherence						Viral Suppression					
	<100% ART adherent (N = 112)		100% ART adherent (N = 108)		Adjusted relative risk ** (N = 197)		Not virally suppressed (N = 50)		Virally suppressed (N = 170)		Adjusted relative risk *** (N = 197)	
	N	(%)	N	(%)	ARR*	(95% CI)	N	(%)	N	(%)	ARR*	(95% CI)
Patterns of alcohol use												
Any alcohol use	73	(67%)	45	(42%)	0.72	(0.53 – 0.97)	30	(60%)	88	(52%)	0.95	(0.82 – 1.10)
Unhealthy alcohol use	31	(28%)	17	(16%)	0.76	(0.52 – 1.10)	16	(32%)	32	(19%)	0.78	(0.63 – 0.96)
Heavy episodic drinking	39	(35%)	17	(16%)	0.65	(0.44 – 0.96)	17	(34%)	39	(23%)	0.88	(0.73 – 1.07)

ART – antiretroviral therapy

Bold used to indicate p-value <0.05 based on χ^2 test for independence or Wald test

* Individuals without complete covariate data were dropped from the multivariable analysis

** Adjusted for demographic, social, and clinical characteristics, study site and intervention arm

*** Adjusted for demographic, social, and clinical characteristics, study site, intervention arm, and ART adherence