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Psychosocial Complications of HIV/AIDS-Metabolic Disorder Comorbidities among Patients in a Rural area of Southeastern United States

Dominica Hernandez, PhD¹, Seth C. Kalichman, PhD¹, Harold P. Katner, MD², Kaylee Burnham, PhD¹, Moira O. Kalichman, MSW¹, and Marnie Hill, MS²

¹University of Connecticut

²Mercer University Medical School

Abstract

As people living with HIV (PLWH) experience longer life-expectancies resulting from antiretroviral therapy, comorbid conditions are increasing, particularly metabolic disorders. There is potential for psychosocial factors such as stigma experiences, depression, and alcohol use to complicate both HIV infection and metabolic disorders, including diabetes mellitus and hyperlipidemia. While the impact of these psychosocial factors on HIV infection alone are widely studied, their role in potentially complicating HIV co-morbid metabolic conditions has received little attention. This study examined the association between HIV-related stigma and depression, and the potential role of alcohol use as a mediating factor in a clinical sample of patients with comorbid HIV infection and metabolic conditions. Results demonstrated that HIV stigma is associated with depression and this relationship is in part accounted for by alcohol use. Our results indicate that interventions aiming to improve the health of people living with HIV and co-morbid metabolic disorders should prioritize addressing alcohol use as it is related to sources of stress, such as stigma, and depression.

Keywords

HIV Stigma; Comorbidity; Metabolic Disease; Psychosocial Complications; Depression; and Alcohol Use

Introduction

Advances in antiretroviral therapies (ART) extend the life expectancies of people living with HIV (PLWH), ushering in a new era where comorbid medical conditions are replacing opportunistic infections as the most significant threats to the health of PLWH. Among the HIV-related comorbidities of greatest concern are co-occurring metabolic disorders, such as diabetes mellitus (Hernandez-Romieu, Garg, Rosenberg, Thompson-Paul, & Skarbinski, 2016; Tripathi et al., 2014). Diabetes itself increases risks for heart disease, neurological

damage, kidney disease and blindness (Harris, 1998; Perkins, 2004). The 4.8% prevalence of diabetes in PLWH is comparable to the 8% prevalence of the general U.S. population (Hernandez-Romieu et al., 2016). However, diabetes complicates HIV infection and is complicated by use of antiretroviral therapies (Tsiodras, Mantzoros, Hammer, & Samore, 2000; Walli, Goebel, & Demant, 1998). In particular, certain classes of ART, especially protease inhibitors, cause metabolic disruptions with direct links to impaired glucose tolerance, hyperglycemia, and lipodystrophy (Tsiodras et al., 2000; Walli et al., 1998). Metabolic conditions such as lipoprotein disorders are themselves risk factors for developing diabetes (Dube & Cadden, 2011; Florescu & Kotler, 2007; Tebas, 2008; Wellen & Hotamisligil, 2005; Wierzbicki, Purdon, Hardman, Kulasegaram, & Peters, 2008). In addition, hyperlipidemia causes arterial inflammation, which in turn can lead to hyperglycemia and subsequently the development diabetes (O'Brien, Nguyen, & Zimmerman, 1998).

Psychosocial factors are known to exacerbate both HIV infection and metabolic disorders. For example, depression is the most common psychiatric condition that complicates HIV and can lead to poorer health outcomes (Castel et al., 2016). Individuals with major depressive disorder have a prevalence and incidence of hyperlipidemia exceeding the general population (Chien, Lin, Chou, & Chou, 2013). Depression is also a risk factor for developing diabetes and among persons who have diabetes, depression can contribute to hyperglycemia, diabetic complications and increased mortality (Deschenes, Burns, Pouwer, & Schmitz, 2017; Rustad, Musselman, & Nemeroff, 2011).

Alcohol use is another social-behavioral factor that complicates both HIV and metabolic comorbidities, including advancing HIV disease progression and increased risks of developing diabetes (Holbrook, Barrett-Connor, & Wingard, 1990; Szurkowska et al., 2007). Alcohol use is also associated with ART non-adherence and preventable mortality among PLWH (Braithwaite & Bryant, 2010). Even modest alcohol use has adverse impacts on HIV-related health outcomes independent of ART adherence (Justice et al., 2016). Likewise, drinking increases the risk of developing diabetes in persons with comorbid hypercholesterolemia (i.e., elevated levels of cholesterol) (Holbrook et al., 1990). Alcohol use may also interact with HIV and metabolic disorders by interfering with enzymes that regulate the bioavailability of ART (Jin et al., 2011; Midde et al., 2016).

Additional factors that contribute to both depression and alcohol use may further compromise the health of people with comorbid HIV infection and metabolic disorders (Breet, Kagee, & Seedat, 2014; Chambers et al., 2015; Onyebuchi-Iwudibia & Brown, 2014). Of particular importance are HIV-related stigma and discrimination experiences that have known health implications for people living with HIV (Chambers et al., 2015). Stigma experiences are not evenly distributed across populations with greater stigma occurring in rural areas relative to urban centers (Kalichman, Katner, Banas, & Kalichman, 2017). Stigma experiences, such as discrimination or enacted stigma, contribute to depression by impacting self-image, social standing, and social support (Bogart et al., 2011). Enacted stigma and its consequences, including depression, are associated with alcohol use. That is, drinking can be a form of maladaptive coping response (Balogun, Koyanagi, Stickley, Gilmour, & Shibuya, 2014; Howell, Leyro, Hogan, Buckner, & Zvolensky, 2010), both in

seeking relief from depression and escaping the impacts of stigma (Berger-Greenstein et al., 2007; Earnshaw, Smith, Cunningham, & Copenhaver, 2015; Levi-Minzi & Surratt, 2014). Given the potential interplay of HIV stigma, depression, and alcohol use in HIV and comorbid conditions, we posit that alcohol use in relation to HIV stigma may at least in part account for the association between HIV stigma and depression. Accounting for the factors that underlie depression in PLWH with comorbid conditions may better inform future interventions that aim to promote optimal health outcomes in this patient population.

The current study was therefore conducted to examine alcohol use, which is severely detrimental to individuals with comorbid metabolic disorders, as a mediating factor in the relationship between stigma (stress) and depression. We tested a mediation model where we hypothesized HIV stigma experiences would be associated with depression through alcohol use among PLWH and comorbid diabetes and/or hyperlipidemia. Our mediation model is empirically grounded in previous studies reported in the literature that links stigma with depression (Turan et al., 2017; Wohl et al., 2013). In this study we conceptualize stigma experiences as a marker for stress with alcohol use as a potential maladaptive coping response. We restricted our sample to patients with comorbid HIV and metabolic conditions because of the significant risks alcohol use poses to these patients. To our knowledge, this is the first study to test these associations in people diagnosed with HIV and a comorbid chronic condition.

Methods

Participant recruitment occurred between February and April of 2016. Eligible participants were 18 years or older, HIV positive with an existing comorbid metabolic condition, and receiving services from an infectious disease clinic serving the small city of Macon and its surrounding rural areas of Southeast Georgia. A total of 200 men and women living with HIV were screened using medical records to identify patients with co-morbid metabolic conditions. Examination of medical records identified 40% of those screened as having a comorbid metabolic condition, yielding a final sample size of 79 participants for analysis.

Procedures

Participants were recruited through targeted convenience sampling at an infectious disease clinic where our participants receive medical services for HIV. During their scheduled office visit, clinic patients were invited to participate in the study and provided informed consent. At time of consent, participants completed an audio-computer assisted self-interview (ACASI) to collect demographic-health characteristics and measures of enacted stigma experiences, depression, and alcohol use (Morrison-Beedy, Carey, & Tu, 2006). Participants also consented to allow retrieval of their electronic medical records over a 12-month period, 6-months prior to and 6-months after the date they completed the ACASI. We collected medical information pertaining to general health (e.g., blood pressure, height, weight, and cholesterol) in order to profile participants' current metabolic disturbances. We calculated participants body mass index (BMI) using weight and height. Medical diagnostic codes using the International Classification from Diseases (ICD 9/10) (World Health Organization (WHO), 2016) were obtained from electronic medical record and used to identify patients

with a comorbid metabolic condition. Participants were compensated for their time to complete study measures with a \$15 cash (ATM) card. The University of Connecticut and Mercer University Institutional Review Boards approved all procedures.

Materials

Demographic and Health Characteristics—Participants were asked demographic information including their gender, age, years of education, race, employment status and city of residence. Behavioral health characteristics were self-reported and included other information not obtained from their electronic medical records.

Enacted HIV stigma—The HIV Stigma Mechanism Measure was used to assess enacted HIV stigma (Earnshaw et al., 2013). We adapted this scale to extend the stigma experiences to relationships outside of health care settings including family relationships and community contacts. Example items from the Enacted HIV Stigma scale include, “How often have community or social workers discriminated against you because of your HIV status,” and “How often have healthcare workers avoided touching you because of you HIV status?” Examples of additional items include, “How often have you lost friends by telling them you have HIV,” and “How often have people physically backed away from you because of your HIV status?” Participants rated 20 items on a scale from 0 (*never*) to 6 (*almost everyday*) that were summed to create a composite score indicating the frequency of enacted stigma over the course of one year. ($\alpha = .94$).

Depression symptoms—The Center for Epidemiological Studies-Depression Scale (CES-D) was used to assess current depression symptomatology (Radloff, 1977). We used the full 20 item scale reflecting a broad range of depression symptoms. Participants rated the frequency with which they have experienced depression symptoms over the course of one week (e.g., “I felt that I could not shake off the blues even with help from my family or friends,” and “I thought my life had been a failure”). Depression symptoms were rated on a scale from 0 (*0 days*) to 3 (*5–7 days*). The CES-D uses a cut-off score of 16 to indicate possible depression and was internally consistent in our sample ($\alpha = .88$).

Alcohol use—The Alcohol Use Disorders Identification Test (AUDIT) was used to assess alcohol consumption and problem drinking. The AUDIT is a 10-item alcohol screener for problem drinking (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The scale is comprised of three domains: consumption, dependence, and alcohol-related problems. Items from the AUDIT include, “How often do you have a drink containing alcohol,” and “How often during the last year have you had a feeling of guilt or remorse after drinking?” Participants rated items on a scale from 0 (*never*) to 4 (*Daily or almost daily*). The AUDIT has a cut-off score of 7 to indicate potential problem drinking ($\alpha = .90$).

Medical Records—Medical information was extracted from medical records that was entered prior to and most proximal to participants’ enrollment date. When medical records data was not available before the participant’s enrollment date, we extracted the most proximal data after their enrollment date. Data were collected to describe the health status of the sample, particularly pertaining to metabolic co-morbidities, e.g., lipid profiles (i.e.,

cholesterol, triglycerides, and high and low-density lipid proteins), glucose (i.e., blood sugar) and participant vital signs (i.e., blood pressure). As reference points we include measurement ranges for the health characteristics (National Cholesterol Education Program National Heart, Lung, and Blood Institute National Institutes of Health, 2001)

Data Analyses

All variables were first inspected for conformity to assumptions of parametric statistical analyses. Descriptive analyses on participant demographic and health characteristics were conducted with the sample partitioned by sex. Analysis of variance (ANOVA) was used for continuous variables and chi-square contingency table tests for categorical variables with Fisher's exact tests for sparse tables (cell count < 5). We calculated Pearson correlation coefficients (r) to examine bivariate associations among model variables. The main study hypothesis regarding alcohol use as a mediator of the association between stigma experiences and depression was tested using PROCESS macro for SPSS (Hayes, 2013). Bias corrected bootstrap confidence intervals (95%) were calculated to estimate indirect, direct, and total effects using 1000 iterations; SPSS, Version 21 was used for all analyses. Using rules of thumb provided by VanVoorhis and Morgan (2017) we estimated power for the three variable mediation model using a sample size of 25 participants per variable assuming magnitudes of association among the variables between .20 and .40. Statistical significance was defined as $p < .05$ for all analyses.

Results

Seventy-nine patients were diagnosed with both HIV and a metabolic disorder. Of these patients, 70 were diagnosed with a lipid protein disorder, specifically hyperlipidemia (e.g., mixed and other). The remaining 9 participants had comorbid diagnoses of hyperlipidemia and diabetes mellitus. Descriptive comparisons of participants partitioned by sex showed no differences between groups on race, education, employment, age, or stigma experiences (see Table 1). Across participants there were significant levels of depression with a sample mean CESD score of 16.1 (SD=12.0). Women had significantly higher depression scores ($M=19.7$; $SD=12.8$) than men ($M=13.7$; $SD=11.0$), and significantly more women (56%) met the CESD depression cutoff than men (28%). Alcohol use was also common in our sample, with 65% of participants reporting current alcohol use. Of those using alcohol, 27% reported monthly drinking, 17% reported drinking 2–4 times per month, 11% reported drinking 2–3 times per week, and 7% reported drinking more than 4 times per week. Additionally, quantity of “typical daily drinking” included 69% reporting drinking 1–2 drinks, 20% reported drinking 3–4 drinks, 6% reported drinking 5–6 drinks, and 3% reported drinking 7–9 drinks on a typical day. Comparisons of participants by sex showed significant differences on BMI and triglycerides. Women had a significantly higher BMI ($M = 30.8$; $SD = 8.4$) when compared to men ($M = 25.9$; $SD = 5.4$) and men had significantly higher levels of triglycerides when compared to women (See Table 2).

Mediation Model

Prior to testing the planned mediation model (see Figure 1), variables were assessed for their inter-correlations. We observed significantly positive associations between enacted stigma,

depression, and alcohol use (see Table 3). This pattern of associations met our assumptions for statistical power and supported moving forward with testing the proposed mediation model using enacted stigma as the continuous predictor, depression as the continuous outcome and alcohol use (i.e., AUDIT score) as the continuous mediator. Results showed that the total effect of HIV stigma on depression was significant, (path $c = 1.84$, $p < .05$) (see Table 4). The indirect effect of enacted HIV stigma on depression through alcohol use was also statistically significant ($CI = .002$ to $.193$), indicating that enacted stigma indirectly influences depression through its effects on alcohol use with greater experience of enacted HIV stigma predicting greater depression symptoms. Experiencing greater HIV stigma was related to more alcohol use (path $a = .09$, $p < .05$), which was associated with increased depression (path $b = .58$, $p < .01$). The direct effect (path $c' = .131$) was not statistically significant [$t(78) = 1.74$, $p = .085$, $CI = -.018$ to $.279$], indicating that there was no evidence that enacted stigma's effect on depression was independent of its effect on alcohol use. The total effect was statistically significant ($CI = .030$ to $.338$), demonstrating more enacted stigma experiences were related to higher levels of depression and mediated by alcohol use.

Discussion

Alcohol use significantly mediated the relationship between HIV stigma experiences and depression in our sample of patients with comorbid HIV-metabolic conditions. We observed direct effects of HIV-related stigma on depression and that alcohol use accounted for this association. The indirect effect of alcohol use in the model indicated that participants experiencing greater enacted HIV stigma also reported more symptoms of depression, and this relationship, in part, was accounted for by increasing alcohol use. These results corroborate past research on the associations between, enacted stigma, depression and alcohol use (Berger-Greenstein et al., 2007; Earnshaw, Smith, Chaudoir, Amico, & Copenhaver, 2013; Levi-Minzi & Surratt, 2014). However, while these associations have been observed among people living with HIV in general, our study highlights that this pattern of associations has the potential to complicate HIV-metabolic comorbidities (Deschenes et al., 2017; Rustad et al., 2011).

Beyond the hazards of alcohol use in complicating the course of HIV infection, particularly by impeding ART adherence treatment (Braithwaite & Bryant, 2010; Midde et al., 2016), alcohol use has the potential to exacerbate the effects of depression on metabolic disorders. Alcohol use is associated with experiencing HIV-related stigma, a marker for one source of stress facing PLWH. Our findings therefore illustrate how the tumultuous relationship of stress-drinking-depression may amplify the impact of enacted stigma on depression. The psychosocial triad of stigma-drinking-depression can therefore exacerbate metabolic disorders of diabetes and hyperlipidemia, compromising the health of people living with HIV.

Our study results should be interpreted in light of its limitations. We included a convenience clinical sample and our data were not exhaustive of other variables that may mediate and/or moderate the relationship between enacted stigma and depression. As is the case with other mediation models of depression, alcohol use is only one factor that may account for its association with HIV Stigma. Important factors that could also mediate and/or moderate

these associations include, but are not limited to social support (Dour et al., 2014; Gibbie, Hay, Hutchison, & Mijch, 2007; Lehavot et al., 2011), trauma (Adewuya et al., 2009; Breet et al., 2014), and food insecurity (Kapulsky, Tang, & Forrester, 2015; Tsai et al., 2012). Future studies should investigate additional predictors, outcomes, and covariates as they may also account for unique dimensions in these associations. As it was our primary intention to explain *how* (i.e., through alcohol use) HIV stigma may be related to depression, our entire sample was comprised of people living with both HIV and a co-occurring metabolic disorder. While we had sufficient statistical power to test our main hypotheses, future studies with larger sample sizes are needed to examine these associations within and between relevant groups, such as sex. For example, consistent with findings from past studies (Arseniou, Arvaniti, & Samakouri, 2014; Nanni, Caruso, Mitchell, Meggiolaro, & Grassi, 2015), we found that women had significantly higher levels of depression when compared to men. We also found differences between men and women in the severity of markers for metabolic disturbances. Our results therefore indicate the need for future studies with sufficient sample sizes to replicate our model in a groups approach for men and women.

This study is also limited by its single geographic location as data collection took place in one rural area of one southern US state. Although the majority of new HIV infections in the US are occurring in the south, the location of our study cannot be considered representative of this diverse region. Finally, our key psychosocial measures were collected by self-report and may be limited by recall and social biases. For example, although 65% of our sample reported current alcohol use, these rates of drinking should be considered a lower-bound estimate given tendencies to under-report alcohol use. With these limitations in mind, we believe the study results have implications for future research and may inform clinical care of PLWH and comorbid metabolic disorders.

Our findings suggest that alcohol use should be prioritized in the treatment of depression in PLWH with comorbid metabolic disorders, particularly drinking that may occur in response to stressors such as HIV-related stigma experiences. A recent review of behavioral interventions aimed at reducing disordered drinking among PLWH found few efficacious interventions (Brown, DeMartini, Sales, Swartzendruber, & DiClemente, 2013). Specifically, only 14 interventions reported alcohol use outcomes among PLWH (Mills et al., 2017). The review highlighted that available findings were mixed and limited in terms of reducing binge drinking, alcohol abuse and alcohol dependence. However, the authors highlighted one intervention that used a cognitive-behavioral stress management approach that was effective in improving psychosocial functioning and reducing alcohol use.

People living with HIV face multiple mental health challenges with the potential to negatively impact health outcomes. Future interventions that focus on ameliorating depression in PLWH should attend to psychosocial and contextual factors tied to HIV stigma experiences and alcohol use. Specific attention should be given to reducing even modest alcohol as a complicating factor in depression, as well as posing significant concerns for HIV disease and especially metabolic disorders. As noted earlier, cognitive-behavioral, stress management interventions have demonstrated effectiveness in increasing adaptive coping in people living with HIV and may be used to reduce stress-induced alcohol use.

As people continue to benefit from medical advances in the management of HIV infection, clinical care will also need to adapt to comorbid chronic conditions including the psychosocial factors that pose synergetic effects on comorbidities. Directly addressing psychosocial factors, such as stigma, alcohol use and depression should be part of the adaptive strategies to alleviate disease burden and promote optimal health outcomes. People living with HIV face a multitude of health disparities that are driven, in part, by social factors (i.e., HIV stigma) and their consequences (i.e., alcohol use and depression). We are not aware of current treatments focused on psychosocial co-factors of HIV-metabolic disorder comorbidities. Psychosocial interventions are therefore needed and should be a priority in efforts to manage HIV-metabolic comorbidities.

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Figure 1.
Mediation of Enacted Stigma on Depression through Alcohol Use.

Table 1

Demographic and Behavioral Characteristics by Sex

Demographic Characteristics					
	Men		Women		
	(<i>N</i> = 47)		(<i>N</i> = 32)		
	<i>n</i>	(%)	<i>n</i>	(%)	<i>p</i>
Race					4.4 .12
Black	39	(82.6)	28	(87.6)	
White	8	(17.4)	2	(6.2)	
Other	0	(0.0)	2	(6.2)	
Education					1.3 .91
8 th grade or less	2	(4.3)	0	(0.0)	
Some high school	11	(23.4)	7	(21.9)	
High school or equal	18	(38.1)	13	(40.6)	
Some college	11	(23.4)	9	(28.1)	
Completed College	5	(10.6)	3	(9.4)	
Employment					3.5 .30
Full Time	5	(10.6)	4	(12.5)	
Part Time	3	(6.4)	3	(9.4)	
Disability	30	(63.8)	14	(43.8)	
Unemployed	9	(19.1)	11	(34.4)	
Outcome Variables					
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>F</i> <i>p</i>
Age	50.3	(10.8)	47.8	(13.0)	.90 .34
Enacted Stigma	9.1	(15.4)	9.9	(19.5)	.04 .85
CESD	13.7	(11.0)	19.7	(12.8)	4.8 <.05*
AUDIT (total score)	5.6	(8.4)	3.0	(4.6)	2.4 .12
AUDIT (consumption)	2.9	(3.1)	1.7	(1.9)	3.8 .06
AUDIT (dependence)	1.2	(2.6)	.68	(1.7)	1.1 .30

Note. Categorical differences were assessed by Fisher's Exact Tests; Chi square was used for variables with cell counts > 5. Univariate ANOVA was used to assess continuous variables.

100>p

'p<.01
**
'p<.05
*

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Table 2

Health Markers by Lower and Higher Depression Symptom Groups

		Health Characteristics					
		Men			Women		
		(N=47)			(N=32)		
		n	%	M (SD)	n	%	M (SD)
Weight		---	---	---	---	---	---
BMI		---	---	---	---	---	---
		---	---	181.6 (34.4)	---	---	181.8 (52.3)
		---	---	25.9 (5.4)	---	---	30.8 (8.4)
		---	---		---	---	<.05*
		---	---		---	---	.334
Blood Pressure							
				2.12 (.06)			2.10 (.06)
							.142
							.190
		12	(25.5)		14	(43.8)	
		17	(36.2)		12	(37.5)	
		16	(34.0)		5	(15.6)	
		2	(4.3)		1	(3.1)	
				1.91 (.06)			1.90 (.07)
							.190
							.576
		21	(44.7)		17	(53.1)	
		14	(29.8)		11	(34.4)	
		10	(21.3)		3	(9.4)	
		2	(4.3)		1	(3.1)	
				2.28 (.10)			2.27 (.10)
							.805
							.745
Total Cholesterol (mg/dL)							
		23	(57.5)		20	(66.7)	
		9	(22.5)		6	(20.0)	
		8	(20.0)		4	(13.3)	
				1.99 (.16)			2.00 (.15)
							.913
							.828
LDL Cholesterol (mg/dL)							
		29	(50.0)		17	(58.6)	
		11	(28.9)		6	(20.7)	
		5	(13.2)		3	(10.3)	

Health Characteristics									
Men					Women				
	n	%	M	(SD)	n	%	M	(SD)	p
	(N=47)				(N=32)				X ² (p)
High (160–189)	1	(2.6)			2	(6.9)			
Very High (> 190)	2	(5.3)			1	(3.4)			
HDL Cholesterol (mg/dL)			1.70	(.17)			1.75	(.16)	.184
Optimal (>60)	10	(25.0)			13	(43.3)			
Below Optimal (40–59.9)	19	(47.5)			13	(43.3)			
Low (<40)	11	(27.5)			4	(13.3)			
Triglycerides (mg/dL)			2.20	(.24)			2.10	(.27)	.052
Normal (<150)	15	(37.5)			20	(66.7)			<.05*
Borderline high (150–199)	14	(35.0)			4	(13.3)			
High (>200)	11	(27.5)			6	(20.0)			
Glucose (mg/dL)			2.00	(.14)			1.99	(.14)	.791
High (>100)	34	(72.3)			21	(67.7)			.663
Optimal (<100)	13	(27.7)			10	(32.3)			
A1c			.85	(.06)			.86	(.10)	.928
Normal (<5.7%)	3	(27.3)			7	(35.0)			.842
Prediabetes (5.7–6.4%)	6	(54.5)			10	(50.0)			
Diabetes (> 6.5%)	2	(18.2)			3	(15.0)			

Note. Categorical differences were assessed by Fisher's Exact Tests; Chi square was used for variables with cell counts > 5. Univariate ANOVA was used to assess weight difference. All biomarkers were log transformed prior to comparisons.

* p<.05,

** p<.01,

*** p<.001

Table 3

Correlation Matrix of Variables Included in the Model.

	Bivariate Correlations	
	Enacted Stigma	Depression
Depression	.262 *	
Alcohol Use	.223 *	.386 **

Note. Bivariate Analysis by Pearson Correlation*
p<.05,**
p<.01,***
p<.001

Table 4

Mediation of Enacted HIV Stigma on Depression through Alcohol Use

Predictor	Mediation Model				
	β	SE	t	p	$LLCI^a$ $ULCI^b$
Alcohol Use					
Constant	3.66	.90	4.04	<.001***	1.859 5.46
Enacted HIV Stigma	.09	.05	2.01	<.05*	.005 .186
Depression					
Constant	12.27	1.56	7.86	<.001***	9.165 15.384
Alcohol Use	.58	.18	3.24	<.01**	.222 .933
Enacted HIV Stigma	.13	.07	1.74	.086	-.018 .279
Indirect Effect	.053	.04	---	---	.002 .193
Direct Effect	.131	.07	1.74	.085	-.018 .279
Total Effect	.184	.07	2.38	<.05*	.030 .338

Note. Mediation by ordinary least squares path analysis using 95% bias-corrected bootstrap confidence intervals on 1,000 bootstrap samples; a = lower level confidence interval, b = upper level confidence interval

* p<.05,

** p<.01,

*** p<.001