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Mental health and substance use among patients in a North Carolina HIV clinic

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Abstract

Background—The HIV/AIDS epidemic is a significant public health concern in North Carolina, and previous research has pointed to elevated mental health distress and substance use among HIV-infected populations, which may impact patients' adherence to medications. The aims of this study were to: 1) describe the prevalence of mental health and substance use problems among patients of a North Carolina HIV clinic and examine differences by demographics, and 2) examine factors associated with sub-optimal adherence to HIV medications.

Methods—This study was a secondary analysis of clinical data routinely collected through a health behavior questionnaire at a large HIV clinic in North Carolina from February 2011 to August 2012.

Results—The sample included 1,398 patients. Overall, 12.2% of patients endorsed current symptomology indicative of moderate or severe levels of depression, and 39.2% reported receiving any psychiatric diagnosis in their lifetimes. Additionally, 19.1% had indications of current problematic drinking and 8.2% reported problematic drug use. Nearly one-quarter (22.1%) reported sub-optimal adherence to HIV medications. Factors associated with poor adherence were: racial/ethnic minority, less than 35 years old, and indications of moderate or severe depression.

Limitations—The questionnaire was not completed systematically in the clinic, which may limit generalizability, and self-reported measures may have introduced social desirability bias.

Conclusion—Patients were willing to disclose mental health distress, substance use and sub-optimal medication adherence to providers, highlighting the importance of routinely assessing

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these behaviors during clinic visits. Findings suggest that treating depression may be an effective strategy to improve adherence to HIV medications.

INTRODUCTION

The HIV/AIDS epidemic disproportionately affects the Southern region of the United States. Southern states have a higher annual incidence of HIV (20.9 per 100,000 adults), compared with the Northeast (18.1), West (12.0), and Midwest (9.3) ¹. In North Carolina, estimates suggest that over 40,000 individuals (304 per 100,000 adults and adolescents) are currently infected with HIV ². The prevalence of HIV infection in the state has clear racial disparities, with new HIV diagnoses being three times greater among Latinos and nearly 10 times greater among African-Americans, compared to Whites, and HIV-associated mortality being much higher among infected minority populations ².

HIV-infected individuals have higher levels of depression and substance use than the general population. A meta-analysis examining the relationship between HIV infection and depressive disorders found the prevalence of major depression to be nearly two times higher in HIV-positive individuals than HIV-negative individuals ³. More recently, a study utilizing structured clinical interviews to assess mental health in a large nationally representative sample of adults found HIV-infected men to be over three times more likely to be depressed within the last 12 months than men without HIV ⁴. Substance use is also high among HIV-infected individuals. In another nationally representative sample of patients receiving care for HIV, half of the HIV-infected sample reported illicit drug use during the previous 12 months, and 12% screened positive for drug dependence in structured clinical interviews ⁵. In a subsequent national prevalence study, rates of heavy drinking were nearly twice as high among HIV-infected individuals compared to the general population ⁶. Moreover, the comorbidity of depression and substance use has been well-documented in both the general population ^{7,8} and among HIV-infected samples ^{9,10}, highlighting the interconnected nature of these two conditions.

The high prevalence of depression and substance use among HIV-infected individuals is particularly concerning due to their impact on adherence to antiretroviral (ARV) medication. A meta-analysis of the impact of alcohol use on ARV medication adherence revealed that individuals who drank alcohol regularly were half as likely to be adherent to their medication as those who abstained or drank very little, and those who met criteria for problematic drinking reported the poorest adherence ¹¹. Additionally, two recent systematic reviews linked depression to reduced adherence, with evidence that antidepressant treatment can effectively improve adherence ^{12,13}. Poor adherence to antiretroviral medication can have devastating health consequences for the individual. In particular, irregular adherence provides the virus an opportunity to replicate, which can lead to drug-resistant mutations that makes the virus even more difficult to treat ¹⁴. In addition to the detriment to an individual's health and well-being, failure to take antiretroviral medications as prescribed can have significant public health consequences, as individuals with suboptimal adherence have a greater risk of transmitting the virus during sexual contact ¹⁵.

In order to provide comprehensive HIV care and sustain effective ARV treatment, it is important to understand and address mental health and substance use in the HIV patient population. Given the burden of HIV infection and disparities in health outcomes in the South, it is crucial for these issues to be explored in this context. The purpose of this study was to examine clinical data from a large HIV clinic in North Carolina in order to (1) describe the prevalence of mental health and substance use problems among HIV-infected patients and examine differences by demographics, and (2) examine the relation between substance use and depression on sub-optimal adherence to HIV medications.

METHODS

Participants and procedures

This study was a secondary data analysis of clinical data routinely collected at a large HIV clinic in North Carolina. This clinic predominantly serves patients without private insurance, with the payer source of patients being divided roughly into equal fourths: (1) private insurance, (2) Medicare, (3) Medicaid, (4) no payer at all. Five full-time social workers are employed in the clinic and are available to provide mental health counseling, substance use counseling, and referral services.

At each clinic visit, patients were given a two-page health screener questionnaire to complete while in the waiting room. Patients took approximately 5-10 minutes to complete the questionnaire while in the waiting room. Providers were given the questionnaire to review, and it was at their own discretion as to whether they discussed it with their patients. Data from the questionnaire were entered into an electronic research database, separate from the patients' medical records. Data were extracted from the database for patients who completed the questionnaire between February 2011 and August 2012. For patients who attended multiple appointments during that time period, only their most recent data were included in this analysis. Data extraction resulted in a dataset of 1,398 unique patients, of approximately 1,900 enrolled patients during that period. This study was approved by the institutional review board (IRB) at the Medical Center.

Measures

Demographics—Patients indicated their gender (male or female) and sexual orientation (heterosexual, gay or lesbian, or bisexual). Patients wrote in their age and race/ethnicity, which we coded into categories of African-American/Black, White, Latino, and other.

Depression—Patients completed the Patient Health Questionnaire-9 (PHQ-9; ¹⁶), a scale that assesses how often individuals were bothered by symptoms of depression (e.g., feeling down, depressed, or hopeless; little interest or pleasure in doing things; feeling tired or having little energy) over the past 2 weeks. Patients indicated how often they experienced each symptom on a 4-point scale: (0) not at all, (1) several days, (2) more than half the days, and (3) nearly every day. Responses from the 9 questions were totaled to create a summary depression score (0-27). Presence and severity of depression symptomology was determined based on standard cutoffs per validity studies: mild (5 to 9), moderate (10 to 14), moderately

severe (15 to 19), and severe (20 to 27) ¹⁷. A score of 10 was indicative of risk for major depressive disorder.

Mental health diagnoses—Patients were asked about lifetime mental health diagnoses. The question stated: “Have you ever been diagnosed with any of the following mental health problems?” Patients were instructed to check all that apply from the following choices: depression; bipolar/manic depression; schizophrenia or psychotic disorder; anxiety (e.g. obsessive compulsive disorder, panic disorder) other (specify); none.

Psychiatric medications—Patients reported whether they were currently taking any psychiatric medication for depression, anxiety, or other mental health issues.

Alcohol use—Patients completed questions from the Substance Abuse and Mental Illness Symptoms Screener (SAMISS) ¹⁸. Three multiple choice questions assessed typical alcohol use, including frequency of drinking, number of drinks on a typical day, and how often they have four or more drinks on one occasion. Responses were scaled on a 4-point or 5-point Likert scale with higher numbers indicative of more problematic drinking. Responses on the questions were totaled (range 0-13), and patients were considered to have problematic drinking if their total score was 5 or more ¹⁸.

Drug use—Patients reported which drugs they had used to get high in the past year from the following choices: marijuana, cocaine, crack, heroin, methamphetamine, painkillers (e.g., oxycodone, percocet), or other. They also indicated how often they used illicit drugs to get high or change the way they felt. According to SAMISS criteria, patients who reported weekly or greater frequency of any drug were considered to have problematic drug use ¹⁸.

Smoking—Patients reported whether or not they currently smoked cigarettes.

Adherence—Patients were asked a question from the Adult AIDS Clinical Trials Group Adherence Instrument to determine the last time they had missed taking their HIV antiretroviral (ARV) medication, if they were prescribed ¹⁹. They were given 6 response choices: Never skipped ARV medication; more than 3 months ago, 1-3 months ago; 2-4 weeks ago; within past 2 weeks; within past 2 days. Patients were considered to have sub-optimal adherence if they reported missing any pills in the previous one month. A recent meta-analysis concluded that a single item assessment of recent missed pills is a valid means of measuring adherence ²⁰.

Analysis

Descriptive statistics were used to characterize demographics of the sample. To examine gender and racial/ethnic differences in mental health and substance use outcomes, chi-square tests were conducted. For the purpose of analysis, we combined the small response categories of Latino and Other with African-American/Black to create a racial minority category. To examine factors associated with sub-optimal adherence to ARV medication, univariate logistic regression analyses were performed with three independent variables (problematic drinking, problematic drug use, and current depression symptomology) and demographic variables. Independent variables that were significantly associated with sub-

optimal adherence ($p < .10$) and all demographic characteristics (age, gender, sexual orientation, and race/ethnicity) were then included in a multivariable logistic regression model predicting sub-optimal adherence. Odds ratios and 95% confidence intervals are reported.

RESULTS

Description of the sample

Data were extracted from 1,398 patients (879 men; 353 women; 166 gender not reported) who completed the clinic's health behavior questionnaire between February 2011 and August 2012 (Table 1). The sample was predominantly male (71.3%), with a mean age of 46. The majority of the sample identified as African-American or Black (56.3%), followed by White (38.2%).

Among female patients, 76.4% identified as African-American or Black, whereas 47.8% of male patients identified as African-American or Black ($\chi^2=76.6$, $p < 0.001$). Of the men who reported their sexual orientation, 73.3% reported being gay or bisexual, and White men were more likely to report being gay or bisexual, compared with men of minority race (86.9% vs. 41.6%, $p < 0.001$).

Mental health

One-third (32.3%) of patients endorsed symptoms indicative of depression, with 12.2% endorsing symptomology indicative of moderate or severe levels of depression (Table 2). Women were significantly more likely to report moderate or severe levels of depressive symptoms than men ($\chi^2=6.67$, $p < .05$). Over one-fifth of the sample indicated that they were currently taking any psychiatric medications for depression, anxiety, or other mental health issues. White patients ($\chi^2=32.88$, $p < .05$) and women ($\chi^2=3.94$, $p < .05$) were more likely to report taking psychiatric medications.

Overall, 38.6% of patients reported receiving a lifetime psychiatric diagnosis. White patients were more likely than minority patients to report a diagnosis of depression ($\chi^2=9.91$, $p < .01$) or anxiety ($\chi^2=22.50$, $p < .001$), while minority patients were more likely to report a diagnosis of schizophrenia or psychotic disorder ($\chi^2=9.52$, $p < .01$). Compared to men, women were more likely to report a diagnosis of depression ($\chi^2=3.93$, $p < .01$), bipolar disorder ($\chi^2=18.30$, $p < .001$), or schizophrenia or psychotic disorder ($\chi^2=21.88$, $p < 0.001$).

Substance use

The majority (63.6%) of patients reported any current alcohol use, and a third of those had indications of problematic drinking (19.1% of the entire sample) (Table 2). White patients ($\chi^2=6.09$, $p < .05$) and men ($\chi^2=13.53$, $p < .001$) were more likely to have indications of problematic drinking.

About one-fifth (19.1%) of patients reported illicit drug use in the past year, and 42.6% of those had indications of problematic drug use (8.2% of the entire sample). The most commonly used drug in the past year was marijuana (18.0%), followed by crack/cocaine (3.8%), painkillers (2.4%), methamphetamine (0.8%), and heroin (0.5%). There were no

differences in overall problematic drug use by race/ethnicity or gender. However, when marijuana use was excluded, minority patients were more likely than White patients to report any other drug use (i.e., cocaine, crack, heroin, methamphetamine, or painkillers) in the past year (8.7% vs. 3.2%, $\chi^2=13.47$, $p<.001$). One-third (31.0%) of the sample reported currently smoking cigarettes, with minority patients being more likely to report smoking ($\chi^2=10.00$, $p<.01$).

Predictors of sub-optimal adherence to HIV medications

Most of the sample (89.8%) reported currently taking ARV medications. Among those taking ARVs, nearly one-quarter (22.1%) reported that they missed taking any of their ARV medication within the past month. Results of the bivariate and multivariable regression models are summarized in Table 3. Factors significantly associated with sub-optimal adherence to ARV medications in univariate analyses were: identifying as a racial/ethnic minority, female gender, younger age, indications of moderate or severe depression, and problematic drug use. In the multivariable model, identifying as a racial/ethnic minority (OR=1.62, $p<.05$), being less than 35 years old (OR=1.73, $p<.05$), and having indications of moderate or severe depression (OR=2.21, $p<.01$) were significant predictors of missed medications.

DISCUSSION

This study examined mental health and substance use, and their association with ARV medication adherence, among patients in a large HIV clinic. Rates of mental health distress and substance use were high in this sample of HIV-infected patients. Compared to a national study that administered the same depression screening instrument, indications of depression were 1.5 times higher in our sample than among the general population (about 12% vs. nearly 8.0%)²¹. A previous study a decade earlier in this setting found rates of mental illness to be 60%, but that study had a much broader definition of mental illness and did not provide information about specific type of symptoms²². In our sample, there were no racial differences in current rates of depression. However, White patients in our sample reported much higher rates of ever having been diagnosed with depression and of ever having been prescribed psychiatric medications. These findings are consistent with the wider literature on depression. A large national prevalence study found higher lifetime rates of depression among non-Hispanic Whites than among African Americans, but no racial differences in diagnoses of depression in the past year²³. Differences between current depression symptomology and engagement with mental health treatment may reflect disparities in access to these services²⁴.

A majority of the sample reported current alcohol use, with nearly one fifth (19%) having indications of problematic drinking, and about one in ten patients (8.2%) having indications problematic drug use. A previous study a decade earlier in this setting reported that 32% of patients were abusing substances, but it is difficult to compare these results with our findings because the previous study collapsed across drug and alcohol abuse²². Drug use in our sample is slightly lower compared to national prevalence rates among patients with HIV, which have found that 12% of HIV-infected adults screen positive for drug dependence in

the past year⁵. However, while national prevalence studies suggest that 8-11% of HIV-infected individuals are heavy or hazardous drinkers^{6,25}, 19% of patients in our sample had indications of problematic drinking. This high level of alcohol use may be a reflection of contextual factors that contribute to the prevalence of HIV in this region, including high levels of HIV-related stigma^{26,27}. Substances may be used as a means of coping with stress related to living with HIV^{28,29}.

Cigarette smoking was also much higher in our sample compared to the national rate (31% vs. 19%)³⁰, although other studies among HIV-positive individuals have found smoking rates ranging between 50 and 70%³¹. Smoking was particularly elevated among women, who reported smoking at a rate nearly double national estimates (30% vs. 17%). In our sample, minorities were significantly more likely to report smoking than Whites. This difference is notable given that national data suggests that minorities smoke at comparable (19% non-Hispanic Blacks vs. 21% Whites) or lower (13% Hispanics) rates than Whites.

The high prevalence of smoking in our sample is troubling because there is evidence that HIV-infected individuals are more vulnerable to the harmful effects of tobacco. Specifically, a large multisite study of veterans found that smoking conferred a significantly higher risk of mortality among HIV-positive individuals than demographically-matched HIV-negative individuals³². Although future research is needed to understand the mechanisms by which smoking increases mortality in this population, there is some evidence that tobacco may reduce the effectiveness of HAART³³. This underscores the importance of targeting smoking cessation in this population.

About a quarter of our sample reported sub-optimal adherence to ARV medications. A meta-analysis of studies across a variety of settings has shown that nearly half of HIV patients have sub-optimal adherence³⁴. Higher adherence in our sample may be due to selection bias. Approximately 500 patients enrolled in the clinic did not fill out the questionnaire, either because they refused participation or because they did not attend any clinical appointments over the 18 month period of data collection. Another 281 patients completed portions of the questionnaire but skipped questions related to adherence. It is possible that the nearly 800 patients who did not disclose adherence habits were significantly less adherent, which would bias our findings.

Disclosure of sub-optimal adherence behaviors may have been further compromised by the fact that data reported in this study were collected through a health behavior questionnaire administered as routine clinical care. Patients completed the questionnaire knowing that their responses would be reviewed by their healthcare provider. This process may introduce social desirability bias and create barriers to full disclosure of highly personal and potentially stigmatizing health behaviors. However, it is notable that a significant number of patients voluntarily reported sensitive information, suggesting a willingness of patients to engage in conversations regarding these behaviors with their healthcare providers. This lends strength to the recommendation that HIV care providers routinely assess mental health, substance use and medication adherence as a part of clinical care³⁵⁻³⁷. Routine screening for these issues allows providers to address barriers to care, make appropriate referrals, and provide more comprehensive support to their patients.

Sub-optimal adherence in our sample was significantly predicted by depression symptoms. This finding is consistent with previous research documenting a robust relationship between depression and poor adherence to HIV medication^{12,13}, providing strong evidence that addressing depression may improve adherence to HIV treatment and subsequently HIV-related clinical outcomes. Moreover, treating depression may also reduce HIV risk transmission behaviors, including sexual risk taking and substance abuse, thus serving as an effective secondary HIV prevention strategy³⁸.

Younger patients and patients of minority race/ethnicity were also more likely to report sub-optimal medication adherence. This may reflect less engagement with the healthcare system that could be caused by a variety of factors. Younger patients may be unfamiliar with the healthcare system due to a shorter history of engagement and may lack the financial stability to attend appointments regularly³⁹. Among minority patients, feelings of discrimination may lead to distrust and disengagement⁴⁰, and economic or social circumstances, including HIV stigma, may limit access to care and consistent use of medications^{41,42}. Sub-optimal adherence among minorities may also be related to social and contextual factors such as poverty and lack of consistent access to care. Poverty can exacerbate the problem directly through lack of insurance and affordable care as well as indirectly, particularly for minorities, through its association with depression and discrimination⁴³. Of individuals in this clinic, for example, only approximately one-fourth have private insurance. This is crucial to consider because unmet basic needs such as food and shelter are known to have the greatest effect on HIV disease progression, over and above medication adherence⁴⁴. Given the high burden of HIV infection in minority communities in the South¹, there is an urgent need to better understand cultural and structural barriers to HIV care engagement, and to provide targeted outreach and services to appropriately engage and retain these high-risk populations in care.

Findings from our study also suggest a need to increase access to behavioral health services. Standard pharmacological and psychotherapy interventions have been shown to be effective among HIV-infected populations⁴⁵⁻⁴⁷, and thus greater integrations of these services into HIV clinics has the potential to improve significantly the identification and management of mental illness. There is evidence of successfully integrating depression or substance use treatment into non-psychiatric clinical settings⁴⁸⁻⁵⁰ suggesting the feasibility of co-locating these treatments into HIV clinics⁵¹. Additionally, given the low socioeconomic status of many patients in the clinic, it may also be important to consider environmental barriers that prevent engagement with care. Antidepressants and psychotherapy interventions have been shown to effectively reduce depression among minority low income populations when coupled with educational outreach, child care, and transportation⁵².

This study has several limitations, in addition to the challenge noted above regarding possible social desirability bias. First, although the health behavior questionnaire was given to all patients, some opted not to fill out the form. Generalizability of the findings may be limited because we do not have information regarding patients who chose not to fill out the form. Non-English-speaking patients may not have been able to complete the form, which may be a reason for the low representation of Latino patients in our sample. Second, we did not have enough power to look at interactions between demographic groups. Future research

would benefit from comparing demographic subgroups (e.g. minority women vs. minority men) to determine whether there are significant differences with regards to retention in care that may be used to inform specialized outreach efforts. Third, use of the most recently completed questionnaire from patients may have biased our results, as it is possible that patients had respondent fatigue and may not have completed the form fully or accurately. Fourth, assessment of medication adherence is based on a single self-report question, which may be compromised by social desirability bias or difficulty remembering the exact time that a dose was last missed. Future research would benefit from a more comprehensive assessment of treatment engagement, beyond medication adherence, including criteria such as consistently staying in care for an extended period of time⁵³ or viral suppression. Fifth, the relationship between sub-optimal adherence and minorities may be confounded by factors that were not measured in the study such as social support or HIV disclosure. Sixth, the clinic screener questionnaire was entered into a separate research database that is not linked to patients' medical record. As a result, we were not able to examine associations with clinical outcomes such as CD4 or viral load. Finally, diagnoses of mental illnesses were measured by patient self-report. We did not have the resources to confirm historical psychiatric diagnosis via medical record review or to conduct clinical assessments for current diagnoses.

In sum, our findings suggest that addressing depression may be a key to improving ARV medication adherence among HIV patients in North Carolina. Providing comprehensive care that addresses mental health and substance use in the HIV clinic setting may lead to improved clinical outcomes. In addition, while access to comprehensive care is necessary, patients must also be motivated to participate in care. In the clinic setting, medical and other providers can boost patient motivation through routine screening, conducting brief interventions with patients in the way they talk about alcohol and substance use, and referral to mental health and substance use services, which are ideally integrated into the HIV clinical care setting^{54,55}. In particular, minority patients, as well as younger patients, may be at higher risk for poor adherence, and thus would especially benefit from increased efforts aimed to improve engagement and adherence.

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Table 1

Description of the patient sample (n=1398)

	% (n)
Gender	
Male	71.3% (879/1232)
Female	28.7% (353/1232)
Age	
17-34	15.8% (215/1358)
35-49	45.4% (616/1358)
50	38.8% (527/1358)
Ethnicity	
African American/Black	56.3% (720/1279)
White	38.2% (488/1279)
Other	3.0% (38/1279)
Latino/Latina	2.6% (33/1279)
Sexual orientation	
Gay/bisexual men	53.6% (450/839)
Heterosexual women	25.4% (213/839)
Heterosexual men	19.5% (164/839)
Lesbian/bisexual women	1.4% (12/839)

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Table 2
 Descriptions of mental health and substance use, and differences by categories of race/ethnicity and gender (n=1398)

	Comparisons by race/ethnicity, % (n)					Comparisons by gender, % (n)		p-value	
	TOTAL (n=1398)	White (n = 488)	Racial Minority (n = 791)	Male (n=879)	Female (n=553)	Male (n=879)	Female (n=553)		
Current mental health									
Any depression (5)	32.3% (415/1286)	33.2% (155/467)	32.4% (234/722)	30.5% (250/820)	38.4% (122/318)	n/s	30.5% (250/820)	38.4% (122/318)	* .007
Moderate or severe depression (10)	12.2% (157/1189)	10.7% (50/467)	12.9% (93/722)	10.5% (86/820)	16.0% (51/318)	n/s	10.5% (86/820)	16.0% (51/318)	* .008
Psychiatric medications	21.9% (302/1380)	30.9% (133/778)	17.1% (150/485)	21.2% (185/874)	26.5% (91/344)	<.001	21.2% (185/874)	26.5% (91/344)	* .029
Lifetime mental health diagnoses									
Any diagnosis	38.6% (497/1288)	46.5% (214/460)	34.6% (251/726)	36.8% (301/817)	45.2% (147/325)	<.001	36.8% (301/817)	45.2% (147/325)	*** .005
Depression	30.7% (396/1288)	36.7% (169/461)	28.0% (203/726)	29.5% (241/817)	37.5% (122/325)	.001	29.5% (241/817)	37.5% (122/325)	*** .005
Anxiety	13.8% (178/1288)	20.0% (92/460)	10.2% (74/726)	13.0% (106/817)	16.3% (53/325)	<.001	13.0% (106/817)	16.3% (53/325)	† .086
Bipolar/manic depression	5.6% (72/1288)	4.5% (21/460)	6.2% (45/736)	3.9% (32/817)	10.5% (34/325)	n/s	3.9% (32/817)	10.5% (34/325)	** <.001
Schizophrenia or Psychotic	2.3% (30/1288)	0.7% (3/460)	3.4% (25/726)	1.1% (9/818)	5.8% (19/325)	.001	1.1% (9/818)	5.8% (19/325)	** <.001
Substance use									
Problematic drinking	19.1% (247/1290)	23.1% (106/458)	17.3% (126/728)	21.8% (178/817)	12.3% (40/325)	.009	21.8% (178/817)	12.3% (40/325)	** <.001
Problematic drug use	8.2% (104/1263)	8.2% (37/450)	8.6% (61/709)	9.1% (73/798)	6.6% (21/317)	n/s	9.1% (73/798)	6.6% (21/317)	n/s
Smoke cigarettes	31.0% (396/1276)	25.8% (118/457)	34.6% (248/717)	29.6% (238/804)	30.2% (98/324)	.001	29.6% (238/804)	30.2% (98/324)	n/s

† p < 0.10

* p < 0.05

*** p < 0.01

Table 3

Univariate and multivariate predictors of sub-optimal adherence to HIV Medication (any missed pills in previous 1 month) (n=1117)

	% poor adherence	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Demographics					
<i>Gender</i>					
Male	20.4%	REF		REF	
Female	26.8%	1.43 (1.03, 1.98)	.032*	1.70 (0.95, 3.07)	.075 [†]
<i>Age</i>					
17-34 years	31.8%	1.72 (1.15, 2.56)	.008**	1.75 (1.03, 2.97)	.037*
35-49 years	21.4%	REF		REF	
50 years and older	19.5%	0.89 (0.65, 1.23)	n/s	1.04 (0.66, 1.65)	n/s
<i>Ethnicity</i>					
White	18.8%	REF		REF	
Minority	24.6%	1.40 (1.03, 1.91)	.031*	1.62 (1.03, 2.56)	.036*
<i>Sexual orientation</i>					
Heterosexual	24.2%	REF		REF	
Gay/lesbian/bisexual	22.8%	0.93 (0.66, 1.31)	n/s	1.38 (0.77, 2.46)	n/s
Mental Health/Substance Use					
<i>Depression</i>					
None/Mild	20.8%	REF		REF	
Moderate/Severe	35.2%	2.07 (1.35, 3.19)	.001**	2.21 (1.23, 4.00)	.008**
<i>Alcohol</i>					
No problematic drinking	20.9%	REF		REF	
Problematic drinking	27.1%	1.40 (0.99, 1.98)	.056 [†]	1.17 (0.71, 1.93)	n/s
<i>Drugs</i>					
No problematic drug use	21.2%	REF		REF	
Problematic drug use	33.7%	1.89 (1.19, 3.01)	.007**	1.02 (0.52, 2.00)	n/s

[†] p < 0.10

* p < 0.05

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