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Factors associated with hazardous alcohol use and motivation to reduce drinking among HIV primary care patients: Baseline findings from the Health & Motivation study

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Abstract

Background—Limited primary care-based research has examined hazardous drinking risk factors and motivation to reduce use in persons with HIV (PWH).

Methods—We computed prevalence ratios (PR) for factors associated with recent (<30 days) hazardous alcohol use (i.e., 4+/5+ drinks in a single day for women/men), elevated Alcohol Use Disorders Identification Test (AUDIT) scores, and importance and confidence (1–10 Likert scales) to reduce drinking among PWH in primary care.

Results—Of 614 participants, 48% reported recent hazardous drinking and 12% reported high alcohol use severity (i.e., AUDIT zone 3 or higher). Factors associated with greater alcohol severity included moderate/severe anxiety (PR: 2.07; 95% CI: 1.18, 3.63), tobacco use (PR: 1.79;

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Contributors

Authors MJS and DDS designed the study and wrote the protocol. Author WAL conducted the statistical analysis. Author SP provided biostatistical consultation. Author MJS wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of Interest

Author MJS and MAH received research grant funding from Pfizer and Merck. Author WAL received grant funding from Pfizer. All other authors declare that they have no conflicts of interest.

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1.11, 2.88), and other substance use (PR: 1.72; 1.04, 2.83). Factors associated with lower alcohol severity included age 50–59 years (PR: 0.46; 0.22, 2.00) compared with age 20–39 years, and having some college/college degree (PR: 0.61; 0.38, 0.97) compared with high school. Factors associated with greater importance to reduce drinking (scores >5) included: moderate/severe depression (PR: 1.43; 1.03, 2.00) and other substance use (PR: 1.49; 1.11, 2.01). Lower importance was associated with incomes above \$50,000 (PR: 0.65; 0.46, 0.91) and marijuana use (PR: 0.65; 0.49, 0.87). HIV-specific factors (e.g., CD4 and HIV RNA levels) were not associated with alcohol outcomes.

Conclusions—This study identified modifiable participant characteristics associated with alcohol outcomes in PWH, including anxiety and depression severity, tobacco use, and other substance use.

Keywords

hazardous alcohol use; marijuana; interventions; HIV; anxiety; depression

1. Introduction

People with HIV (PWH) have high rates of hazardous drinking¹ and are two to four times more likely than HIV-negative individuals to have an alcohol use disorder.² Drinking at hazardous levels can compromise antiretroviral therapy (ART) response³ and has also been associated with sexual practices that increase risk for HIV transmission.^{4,5} In an era in which ART enables PWH to live longer, hazardous drinking has increasingly impacting individuals' long-term health.⁶ Adverse outcomes include a higher risk of physical and mental health comorbidities,^{7–11} and mortality.^{12,13} For these reasons, alcohol use among PWH continues to be an issue of great public health concern.

Unfortunately, hazardous drinking has not often been addressed in healthcare settings.¹⁴ Providers often fail to discuss alcohol use even when potential problems are recognized,¹⁵ and PWH with alcohol use disorders may be less likely than the general population to initiate specialty alcohol treatment^{12,16} or to receive brief alcohol-related intervention following positive screens for unhealthy alcohol use.¹⁷ Furthermore, alcohol interventions have had limited success in reducing alcohol use in the HIV setting.⁶ This disparity underscores the need for HIV treatment strategies that incorporate alcohol screening and behavioral interventions. In response to this high clinical priority, we initiated a 12-month randomized trial of behavioral interventions designed to decrease hazardous drinking among PWH in a large primary care clinic who reported a range of alcohol use in the prior year.

Here, we report baseline results of the trial, including the prevalence of recent hazardous drinking (≥ 4 drinks in a day for women and ≥ 5 drinks in a day for men within past 30 days) and greater drinking severity based on the validated Alcohol Use Disorders Identification Test (AUDIT) measure¹⁸. We anticipated that participants with a recent history of hazardous drinking and greater severity would also have a higher prevalence of smoking, marijuana and other drug use, and an increased prevalence of psychiatric symptoms, including depression and anxiety, based on prior studies in PWH.^{19–21} In addition, we examined clinical factors associated with motivation (i.e., importance and confidence) to reduce drinking, which have

rarely been examined among PWH. We expected that depression severity and alcohol-related problems would be associated with importance/confidence to reduce drinking in PWH, similar to findings in mental health²² and other high-risk drinking samples.^{23–25} These analyses aim to provide new knowledge regarding the burden of problem drinking in a generalizable sample of PWH in primary care. Understanding motivation to reduce use has the potential to improve understanding of substance use patterns and enhance future behavioral interventions in PWH.

2. Materials and Methods

2.1. Overview

Participants were from an ongoing randomized clinical trial named the “The Health and Motivation Study,” which examined two behavioral alcohol use interventions among hazardous-drinking PWH in a primary care clinic in San Francisco, CA. The two intervention arms consisted of: (1) motivational interviewing to reduce alcohol use, and (2) electronic feedback regarding alcohol use risks via secure messages embedded in the electronic medical record (EMR). A third arm was usual care. Here we analyzed the association of baseline demographic and clinical factors associated with recent hazardous drinking, Alcohol Use Disorders Identification Test (AUDIT) scores which indicates alcohol problem severity, and participants’ perception of the importance of alcohol use reduction and self-confidence in their ability to reduce or eliminate drinking.

2.2. Setting

The study setting was Kaiser Permanente Northern California (KPNC), a large private non-profit integrated health system of 4 million members.²⁶ HIV care has been supported by the long-standing HIV registry consisting of a centralized list of all PWH in KPNC, including clinical EMR data. The registry included more than 26,000 historical patients, including 8,740 currently active patients. The study was based in the KPNC San Francisco Medical Center, which serves >2,900 PWH.

2.3. Participants

Participants were eligible for the parent trial if they reported any days of drinking ≥ 3 drinks in a day (for women) and ≥ 4 drinks in a day (for men) in the prior 12 months. Patients were excluded from recruitment if there was a clinical recommendation from providers that patients were not appropriate due to acute psychiatric problems or inability to understand consent procedures. The demographics of the recruited sample were virtually identical to the demographics of all PWH from the KPNC San Francisco Medical Center (data not shown). All eligible patients recruited for the parent trial were included in the baseline analyses reported here.

2.4. Procedures

Using mailed recruitment letters, flyers, newsletter, and referrals, we contacted 2873 PWH between April 25, 2013 through May 29, 2015. Of these 2873 patients, we screened 1568 (55%) by telephone, and were unable to screen the remaining 1305 (45%). Of the 1305 patients we were unable to screen, 810 (62%) were unresponsive, 406 (31%) declined to be

screened, 73 (6%) had transportation issues and 16 (1%) were non-English speakers. Of the 1568 patients that we did screen, 773 (49%) were eligible for study recruitment. Patients were offered \$50 for completing the baseline and 6-month assessments, and \$100 for the 12-month follow-up assessment (\$200 total). We enrolled 614 (79%) of the 773 eligible patients, since 85 (11%) patients declined to participate, and 74 (9%) patients did not show for their appointment and were unresponsive thereafter. Participants completed written informed consent at the clinic prior to enrollment for the baseline assessment.

2.5. Measures

At enrollment, participants completed a self-administered questionnaire that included demographics and socioeconomic status (age, sex, marital status, education levels, employment, and income), quantity and frequency of alcohol, tobacco, marijuana and other substance use (i.e., prescription drug use other than as prescribed, tranquilizers, stimulants, cocaine, painkillers, heroin, hallucinogens, and ecstasy), and self-reported depression and anxiety. Alcohol use severity was assessed using the 10-item AUDIT which is a validated measure designed to detect alcohol use disorders in the U.S. and internationally,¹⁸ including in PWH. AUDIT scores were categorized by levels of risk: zone 1 (scores 0–7) corresponding with no risk or alcohol abstinence, zone 2 (scores 8–15) corresponding with a recommendation for brief advice regarding alcohol use, zone 3 (scores 16–19) corresponding with additional recommendation for brief counseling and monitoring, and zone 4 (scores 20–40) corresponding with a recommendation for referral to a specialist and treatment.¹⁸ The alcohol importance and confidence ruler scales ask participants to rate how important it is to cut down or stop drinking and how confident they are that they could cut down or stop drinking, with scores ranging from 1 (not at all important/confident) to 10 (extremely important/confident).²⁷ The importance ruler has been validated against measures of stages of change to determine how ready primary care patients are to reduce drinking.²⁷ Higher scores on the importance and confidence rulers are both associated with better alcohol use reduction outcomes.²⁸ These scales are widely used in intervention research although neither measure has been validated in PWH.

Depression symptom severity was measured using the 9-item Patient Health Questionnaire (PHQ-9), with scores of 10 or higher indicating moderate to severe depression.²⁹ The PHQ-9 has shown adequate reliability and validity in PWH.^{30,31} Similarly, anxiety was measured using the 7-item Generalized Anxiety Disorder (GAD-7) scale, with scores of 10 or higher indicating moderate to severe anxiety.³² The GAD-7 has acceptable sensitivity and specificity in identification of generalized anxiety disorder in health care settings³³ but has not been validated in PWH. The primary existing electronic data sources for this study were the HIV registry and EMR, which includes information on prescription medications, inpatient and outpatient diagnoses and visits, laboratory tests, membership dates, and vital status. Key variables for the analysis included race/ethnicity, HIV acquisition risk group (men who have sex with men [MSM], injection drug users [IDU], heterosexual sex, other, unknown), use of antiretroviral therapy (ART) at baseline and CD4 and HIV RNA levels.

2.6. Statistical analysis

We first examined baseline characteristics of study participants. Next, we described alcohol measures for the study sample, including percentage with any alcohol use in the past 30 days, median number of days alcohol use in the past 30 days, number of days in the past 30 days with a hazardous drinking episode (i.e., 4+/5+ drinks in a single day for women/men), AUDIT scores, and median confidence and importance score for reducing or stopping drinking, among those with one or more past 30-day hazardous drinking episodes. Given the observed skewed distribution of alcohol measures (e.g., >50% reported 0 hazardous drinking days and >80% reported AUDIT zones 1 or 2), we dichotomized alcohol measures in subsequent analyses. The primary outcomes of interest were: (1) 1 hazardous drinking episode in prior 30 days (i.e., 4 drinks in a day for women and 5 drinks in a day for men); (2) AUDIT score in the 3/4 zones vs. 2 corresponding with clinical recommendations for brief counseling and/or referral to specialty care;¹⁸ and (3) greater (i.e., score >5) importance and confidence to cut back or stop alcohol use among those with one or more hazardous drinking episodes in prior 30 days. There was no standard cutoff used in the literature for importance/confidence rulers, however the choice of cutoff did not substantially influence results (data not shown).

Next, we fit models to evaluate factors associated with baseline alcohol use measures, as well as importance and confidence measures. Baseline characteristics evaluated were demographics, including age, sex, race/ethnicity (non-Hispanic white, non-Hispanic Black, Hispanic, other/unknown, education (High school, some college/college degree, graduate school), employment status, income (>\$50,000, \$50,000 household income), marital status (married/domestic partner/intimate partner vs. none); HIV characteristics, including HIV acquisition risk factor (MSM, IDU, heterosexual/Other/Unknown), years known HIV-infected (<5, 5–10, 10 years), ART treatment status, CD4 T-cell counts (mean levels and CD4 < 500 cells/μl), and HIV RNA < 75 copies/ml (the lower limit of quantification at KPNC during this time period); psychiatric comorbidity, including moderate/severe depression and anxiety; and substance use in the prior 30 days, including tobacco use, marijuana use and other substances. Unadjusted and adjusted prevalence ratios (PR) were obtained from Poisson regression models with robust standard errors³⁴ using Proc Genmod in SAS (Version 9.3, Cary, NC). Adjusted models included terms for all demographics, HIV characteristics, psychiatric comorbidities and substance use, as defined above.

All study procedures were approved by the KPNC and University of California, San Francisco (UCSF) Institutional Review Boards.

3. Results

The 614 participants were 97% male; 63% non-Hispanic White, 14% Hispanic, 9% African American, 4% other ethnicities, and 10% unknown race/ethnicity; had a median age of 49 (interquartile range [IQR] 43, 57); and 44% were married or partnered. Participants were predominantly on ART (97%), with median CD4 of 638 cells/μl (IQR 477, 836), with 94% HIV RNA levels below the limits of quantification, with a median 14 (IQR 7, 22) years known HIV-infected. The participants' HIV acquisition risk factor included 73% MSM, 6% IDU, and 4% heterosexual/other and 16% unknown. In the 30 days prior to enrollment, 50%

used marijuana and 24% used tobacco. Sixteen percent reported symptoms of moderate/severe depression, and 14% reported moderate/severe anxiety (Table 1).

A total of 94% of participants used alcohol in the past 30 days (Table 2). Fifty-two percent of the study sample did not report a hazardous drinking episode (any 4+/5+ drinks in a day for women/men) in the prior 30 days, with 48% reporting 1 hazardous drinking episode and 23% reporting 4 episodes in the past 30 days. Thirty-six percent had an AUDIT score in zone 2 or higher, with 12% reporting zone 3 or higher. Among those with at least one hazardous drinking episode in the prior 30 days (n=293), the median importance score for reducing or stopping drinking was 4.0 (IQR 2.0, 7.0) and the median confidence score for reducing or stopping drinking was 7.0 (IQR 5.0, 9.0). Both the importance and confidence scores had possible values ranging from 1 (not at all important/confident) to 10 (extremely important/confident).

Many factors were associated with hazardous drinking in bi-variate models, including age, race/ethnicity, employment, income, anxiety, depression, tobacco, marijuana and other substance use, and years known HIV-infected (Supplementary Table 1). In adjusted models (Table 3, left column), factors associated with greater prevalence of reporting one or more hazardous drinking episodes in prior 30 days included Hispanic ethnicity with a PR of 1.35 (95% CI: 1.11, 1.64; p=.002) compared with non-Hispanic Whites, tobacco use with a PR of 1.19 (1.01, 1.42; p=.040), and marijuana use with a PR of 1.22 (1.03, 1.44; p=.043). Factors associated with reduced hazardous drinking included older age, with adjusted PRs of 0.70 (95% CI: 0.55, 0.91; p=.007) and 0.51 (95% CI: 0.35, 0.75; p<.001) for those 50–59 and 60 years respectively, compared with 20–39 year-olds and IDU with a PR of 0.64 (0.43, 0.96; p=.031) compared with MSM.

Similar to the hazardous drinking results, many factors were associated with higher AUDIT scores (i.e., zones 3 or 4) in bi-variate models, including age, race/ethnicity, education, HIV exposure risk factor, anxiety, depression, tobacco other substance use, and years known HIV-infected (Supplementary Table 1). In adjusted models (Table 3, right column), factors associated with greater prevalence of higher AUDIT scores included moderate/severe anxiety (PR=2.07; 1.18, 3.63; p=.011), tobacco use (PR=1.79; 1.11, 2.88; p=.017), and other substance use (PR=1.72; 1.04, 2.83; p=.035). Factors associated with reduced prevalence of higher AUDIT scores included older age, with a PR of 0.46 (0.22, 1.00; p=.050) for those age 50–59 years compared with 20–39 years and higher education, with a PR of 0.61 (0.38, 0.97; p=.036) for those with some college/college degree compared with those with a high school education or less.

Among the 293 participants with one or more hazardous drinking episodes in prior 30 days, we evaluated factors associated with importance and self-confidence to cut back drinking (i.e., importance or confidence scales scores >5). Bi-variate models for importance to cut back alcohol use indicated being employed, having higher income and recent marijuana use were associated with lower importance of cutting back, while moderate/severe anxiety and depression and other substance use were associated with greater importance of cutting back (Supplemental Table 2). In the multivariable model for importance to cut back, factors associated with greater importance included those with moderate/severe depression with a

PR of 1.43 (1.03, 2.00; $p=.035$) and other substance use with a PR of 1.49 (1.11, 2.01; $p=.008$) (Table 4). Factors associated with reduced importance to cut back included those with incomes above \$50,000 with a PR of 0.65 (0.46, 0.91; $p=.012$) compared with those with lower incomes, and marijuana use with a PR of 0.65 (0.49, 0.87; $p=.004$). Bi-variate models for confidence to cut back alcohol indicated Black compared with white race, tobacco users and those with other substance use had reduced confidence to cut back (Supplemental Table 2). In adjusted models, only two factors were associated with reduced confidence: Black race/ethnicity with a PR of 0.60 (0.37, 0.96; $p=.033$) compared with Whites and other substance use with a PR of 0.75 (0.61, 0.93; $p=.008$) (Table 4).

4. Discussion

Understanding hazardous drinking among PWH is an area of significant clinical and public health importance. This study examined factors associated with recent hazardous drinking (4+/5+ level for women/men respectively), alcohol problem severity (AUDIT zone 3/4), and importance and confidence in ability to reduce drinking in a sample of PWH from a large HIV primary care clinic in San Francisco. Evaluation of key demographic and clinical factors identified several associations with recent hazardous drinking or greater alcohol problem severity, including younger age, Hispanic ethnicity, tobacco use, marijuana use, other substance use and moderate/severe anxiety. Relevant to the design of interventions to reduce drinking, moderate/severe depression, and other substance use were associated with greater importance to cut back drinking, while marijuana use, which was reported in 50% of our sample, was associated with lower importance to cut back. Black ethnicity and other drug use were associated with lower confidence in ability to reduce drinking. Of note, HIV clinical factors were not associated with any of the alcohol measures. Identification of the unique factors among PWH in primary care associated with both alcohol-related problems and motivation to cut back use is highly relevant to the successful implementation of alcohol-related interventions in this population.

Although effective ART has extended life expectancy for PWH³⁵, alcohol use and its associated problems continues to greatly complicate patient care. Here we demonstrated that alcohol problems in a primary care-based sample of PWH co-occur with a broad range of behavioral risk factors. Prior studies have also demonstrated that PWH with alcohol problems also have a higher prevalence of smoking, marijuana and other drug use, and an increased prevalence of psychiatric symptoms, including depression and anxiety.^{1,21,36–38} A study in the Veteran's Administration Cohort Study (VACS) indicated that alcohol, smoking and depression synergistically contribute to poor health.³⁹ Here, we also confirmed co-occurrence of these behavioral risk factors, although moderate/severe depression was only associated with hazardous drinking in bi-variate models. Our finding that moderate/severe anxiety was common and associated with higher AUDIT scores also contributes to the limited literature on the clinical significance of anxiety and alcohol use among PWH.^{40,41} To be effective in PWH, alcohol interventions may need to address the role of anxiety sensitivity and emotion regulation in alcohol use patterns.⁴¹ The current findings, in a large sample using well-validated measures of alcohol problem severity and mood symptoms, highlight the extent and complexity of these interrelated behavioral health problems that continue to hinder HIV care.

Limited research exists regarding factors associated with importance to reduce alcohol use in PWH. Studies in mental health³⁸ and other high-risk drinking samples^{23–25} have indicated that depression severity and alcohol-related problems would be associated with greater importance to reduce drinking, which may be attributed to greater concern for health resulting in increased readiness to change behavior.³⁸ Highly relevant to the design of clinical interventions to reduce alcohol use among PWH, patients reporting depression and other substance use rated cutting back on alcohol use as highly important. Individuals who report multiple substances and/or comorbidities are key subgroups to target since clinical interventions should ideally be multifaceted rather than addressing alcohol, drug use or comorbidities in isolation.^{42,43} Interestingly, those with higher incomes and those who reported marijuana use were less likely to indicate a high level of importance to cut back on alcohol use, while those reporting other substances were more likely to indicate a high level of importance. It is possible that those using marijuana relative to other substances, may not view alcohol use as problematic. Given the high prevalence of marijuana use in PWH, and the recent approval of recreational marijuana in California, this could potentially impact the efficacy of alcohol reduction interventions.

Enhancing patients' confidence in their ability to reduce hazardous drinking is also a valuable target of behavioral interventions.^{44,45} The current study identified two factors associated with lower confidence in alcohol use reduction: Black race and drug use other than marijuana. The reasons for these associations are unclear. However, some prior studies have identified racial/ethnic disparities in behavioral health service utilization,⁴⁶ which could potentially impact alcohol reduction self-efficacy. Individuals who use drugs in addition to alcohol may have greater overall substance problem severity.⁴⁷ Study findings suggest that factors associated with race/ethnic disparities and the impact drug use may therefore be key issues to address in the context of alcohol interventions, since patient-centered interventions such as motivational interviewing⁴⁸ are specifically designed to reduce self-perceived barriers to behavior change.

There are some study limitations. Although the sample is comparable to insured PWH, results may not be generalizable to women or to the uninsured. In addition, our sample was limited to a regional sample of PWH in the San Francisco Bay Area and likely not representative of all PWH in the United States or other settings. Thus, while we anticipate excellent internal validity for study findings, caution is warranted regarding generalizability of study findings. An additional limitation was that individuals who declined to participate in the parent trial may have different risk factors compared with those who were enrolled. However, the sample has virtually identical demographic characteristics in comparison with all PWH from the KPNC San Francisco Medical Center as well as similar demographics for HIV cases in Northern California.⁴⁹ The study examined alcohol use levels within a sample of individuals who reported hazardous drinking in the previous year, and did not examine factors associated with hazardous drinking compared with non-drinkers or those who only drink below recommended guidelines. Self-reported use of alcohol, tobacco, marijuana or other substances may have been underreported by some participants, and it is possible that those who tend to inaccurately report alcohol use would also be likely to inaccurately report use of these other substances.

5. Conclusion

PWH comprise a vulnerable population at high risk for health problems associated with hazardous drinking. In a large sample of PWH engaged in care in a primary care clinic in San Francisco who were also enrolled in an alcohol use intervention study, we identified participant characteristics, including anxiety severity, tobacco use, younger age and Hispanic ethnicity that could help target individuals at elevated risk for alcohol-related problems. These factors can be efficiently screened for in clinical settings, especially with access to comprehensive EHRs. We also identified factors associated with motivation to reduce alcohol use, such as depression symptoms and other substance use, which could be taken into account in the further development of effective alcohol intervention strategies. Specifically, since existing alcohol behavioral interventions have seen mixed success,^{50,51} improved clinical understanding of modifiers of alcohol treatment effectiveness may help improve success of future primary-care based alcohol interventions in PWH.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Limited data exist about strategies to reduce risky alcohol use in HIV primary care
- Anxiety, depression and other substance use were linked to greater alcohol severity
- Marijuana, used by 50%, was linked to lower importance to reduce alcohol use.
- Depression and other substance use were linked to higher importance to reduce use.
- Alcohol interventions in HIV primary care can use results to maximize effectiveness

Table 1

Baseline characteristics of persons living with HIV enrolled in the Health and Motivation alcohol use intervention study.

Characteristic	Participants
	N=614
Median age (IQR), years	49.4 (42.8, 57.2)
Age (years), %	
20–39	19.1
40–49	31.4
50–59	31.8
60	17.8
Men, %	97.1
Race/ethnicity, %	
Non-Hispanic White	62.7
Non-Hispanic Black	9.1
Hispanic	14.0
Other	4.0
Unknown	9.8
Education, %	
High school	25.4
Some college/college degree	52.3
Graduate school	22.3
Employed, %	72.5
Income >\$50,000, %	60.8
Married/domestic partner/intimate partner, %	43.8
HIV exposure risk factor, %	
Men who have sex with men	73.1
Injection drug use	6.4
Heterosexual/Other	4.4
Unknown	16.1
Moderate/Severe Anxiety, %	13.8
Moderate/Severe Depression, %	16.1
Tobacco use prior 30 days, %	24.4
Marijuana use prior 30 days, %	49.8
Other substance use ¹ prior 30 days, %	27.4

Characteristic	Participants
	N=614
Median years known HIV-positive (IQR)	14.3 (6.5, 22.3)
On antiretrovirals, %	97.4
Median CD4 T-cells/ μ l (IQR)	638 (477, 836)
HIV RNA <75 copies/mL, %	93.5

IQR, interquartile range

¹ Prescription drug use other than as prescribed, tranquilizers, stimulants, cocaine, painkillers, heroin, hallucinogens, and ecstasy

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Table 2

Baseline patterns of alcohol use among persons living with HIV enrolled in the Health and Motivation Study.

Characteristic	Participants
	N=614
Any alcohol use past 30 days. %	93.5
Median number of days alcohol use past 30 days (IQR)	10.0 (4.0, 20.0)
Number of days in past 30 days had 4/5 ¹ drinks	
0	51.8
1	15.2
2	5.7
3	4.2
4 days	23.1
Alcohol Use Disorders Identification Test (AUDIT)	
Zone 1 (AUDIT score = 0–7)	63.5
Zone 2 (AUDIT score = 8–15)	24.9
Zone 3 (AUDIT score = 16–19)	5.5
Zone 4 (AUDIT score = 20–40)	6.0
Median (IQR) importance score for reducing or stopping drinking ²	4.0 (2.0, 7.0)
Median (IQR) confidence score for reducing or stopping drinking ²	7.0 (5.0, 9.0)

IQR, interquartile range

¹ 4 or more drinks for women and 5 or more drinks for men² Scored from 1 (not at all confident/important) to 10 (extremely confident/important) among those with one or more recent hazardous drinking episodes

Table 3

Multivariable model of factors associated with hazardous drinking episodes in the prior 30 days and higher AUDIT scores.

	1 or more hazardous drinking episodes ^I		AUDIT 3/4 ^I	
	PR (95% CI)	p	PR (95% CI)	p
Age (years)				
20–39 (Reference)	1		1	
40–49	0.95 (0.78, 1.16)	.61	0.88 (0.49, 1.58)	.66
50–59	0.70 (0.55, 0.91)	.007	0.46 (0.22, 1.00)	.050
60	0.51 (0.35, 0.75)	<.001	0.71 (0.29, 1.77)	.46
Men	0.86 (0.49, 1.51)	.61	1.01 (0.29, 3.46)	.99
Race/ethnicity				
Non-Hispanic White (Reference)	1		1	
Non-Hispanic Black	1.05 (0.77, 1.43)	.77	0.81 (0.36, 1.80)	.61
Hispanic	1.35 (1.11, 1.64)	.002	1.06 (0.58, 1.95)	.84
Other/Unknown	1.08 (0.80, 1.45)	.64	1.43 (0.66, 3.06)	.36
Education, %				
High school (Reference)	1		1	
Some college/college degree	1.05 (0.87, 1.26)	.64	0.61 (0.38, 0.97)	.036
Graduate school	1.07 (0.83, 1.37)	.62	0.79 (0.41, 1.51)	.47
Employed	1.11 (0.89, 1.38)	.36	0.83 (0.48, 1.41)	.49
Income >\$50,000	0.92 (0.76, 1.10)	.36	1.08 (0.67, 1.73)	.76
Married/domestic partner/intimate partner	0.93 (0.78, 1.11)	.43	1.05 (0.63, 1.75)	.84
HIV exposure risk factor				
Men who have sex with men (Reference)	1		1	
Injection drug use	0.64 (0.43, 0.96)	.031	0.67 (0.23, 2.02)	.48
Heterosexual/Other/Unknown	0.74 (0.42, 1.30)	.30	2.38 (0.88, 6.41)	.087
Moderate/Severe Anxiety	1.21 (0.96, 1.51)	.10	2.07 (1.18, 3.63)	.011
Moderate/Severe Depression	1.07 (0.86, 1.33)	.53	1.67 (0.97, 2.85)	.063
Tobacco use prior 30 days	1.19 (1.01, 1.42)	.040	1.79 (1.11, 2.88)	.017
Marijuana use prior 30 days	1.22 (1.03, 1.44)	.024	1.09 (0.68, 1.73)	.73
Other substance use ² prior 30 days	1.12 (0.94, 1.33)	.20	1.72 (1.04, 2.83)	.035
Years known HIV-positive				
<5 (Reference)	1		1	
5–10	0.98 (0.76, 1.26)	.86	1.49 (0.77, 2.87)	.23
10 years	0.99 (0.79, 1.24)	.94	0.87 (0.45, 1.67)	.67
CD4 T-cell >500 cells/μL	0.97 (0.80, 1.17)	.74	1.08 (0.63, 1.85)	.79
HIV RNA<75 copies/mL	1.02 (0.75, 1.39)	.90	0.84 (0.41, 1.73)	.64

^I Adjusted prevalence ratios (PR) obtained from Poisson regression models using Proc Genmod in SAS. Adjusted models include terms for all variables listed in table. Bold denotes P<0.05.

²Prescription drug use other than as prescribed, tranquilizers, stimulants, cocaine, painkillers, heroin, hallucinogens, and ecstasy

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Table 4

Multivariable model of factors associated with greater (i.e., score >5) importance and confidence to cut back or stop alcohol use among those with one or more hazardous drinking episodes in prior 30 days (N=293)

	Importance ^I		Confidence ^I	
	PR (95% CI)	P	PR (95% CI)	P
Age (years)				
20–39 (Reference)	1		1	
40–49	0.99 (0.68, 1.44)	.95	1.02 (0.81, 1.28)	.88
50–59	0.97 (0.64, 1.47)	.89	0.98 (0.78, 1.24)	.89
60	0.78 (0.39, 1.54)	.48	0.98 (0.71, 1.35)	.90
Men	0.62 (0.29, 1.34)	.23	0.90 (0.47, 1.70)	.74
Race/ethnicity				
Non-Hispanic White (Reference)	1		1	
Non-Hispanic Black	1.31 (0.85, 2.02)	.22	0.60 (0.37, 0.96)	.033
Hispanic	1.01 (0.70, 1.45)	.97	1.08 (0.90, 1.29)	.41
Other/Unknown	1.30 (0.73, 2.31)	.38	1.03 (0.77, 1.38)	.85
Education, %				
High school (Reference)	1		1	
Some college/college degree	0.92 (0.69, 1.24)	.59	1.06 (0.88, 1.27)	.52
Graduate school	0.85 (0.55, 1.31)	.46	0.94 (0.72, 1.22)	.64
Employed	0.85 (0.62, 1.16)	.31	0.97 (0.80, 1.17)	.74
Income >\$50,000	0.65 (0.46, 0.91)	.012	0.89 (0.76, 1.06)	.19
Married/domestic partner/intimate partner	0.88 (0.65, 1.19)	.41	1.05 (0.90, 1.22)	.55
HIV exposure risk factor				
Men who have sex with men (Reference)	1		1	
Injection drug use	0.51 (0.23, 1.12)	.09	1.05 (0.67, 1.66)	.83
Heterosexual/Other/Unknown	0.94 (0.37, 2.38)	.89	0.88 (0.51, 1.54)	.67
Moderate/Severe Anxiety	1.24 (0.86, 1.79)	.25	0.86 (0.62, 1.18)	.36
Moderate/Severe Depression	1.43 (1.03, 2.00)	.035	0.90 (0.68, 1.19)	.44
Tobacco use prior 30 days	0.80 (0.56, 1.14)	.23	0.90 (0.74, 1.09)	.27
Marijuana use prior 30 days	0.65 (0.49, 0.87)	.004	1.03 (0.89, 1.20)	.68
Other substance use ² prior 30 days	1.49 (1.11, 2.01)	.008	0.75 (0.61, 0.93)	.008
Years known HIV-positive				
<5 (Reference)	1		1	
5–10	1.06 (0.68, 1.64)	.81	0.78 (0.59, 1.02)	.069
10 years	1.09 (0.78, 1.53)	.60	0.89 (0.72, 1.10)	.29
CD4 T-cell >500 cells/μL	1.21 (0.86, 1.72)	.28	1.03 (0.86, 1.23)	.75
HIV RNA<75 copies/mL	1.49 (0.78, 2.83)	.22	0.95 (0.67, 1.36)	.79

^I Adjusted prevalence ratios (PR) obtained from Poisson regression models using Proc Genmod in SAS. Adjusted models include terms for all variables listed in table. Bold denotes P<0.05.

²Prescription drug use other than as prescribed, tranquilizers, stimulants, cocaine, painkillers, heroin, hallucinogens, and ecstasy

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