ORIGINAL PAPER

Drinking Motives Among HIV Primary Care Patients

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Abstract Heavy drinking among individuals with HIV is associated with poor medication adherence and other health problems. Understanding reasons for drinking (drinking motives) in this population is therefore important and could inform intervention. Using concepts of drinking motives from previous alcohol research, we assessed these motives and drinking in 254 HIV-positive primary care patients (78.0 % male; 94.5 % African American or Hispanic) prior to their participation in an alcohol intervention trial. Three motives had good factor structure and internal consistency: "drinking to cope with negative affect", "drinking for social facilitation" (both associated with heavier drinking), and "drinking due to social pressure" (associated with less drinking). Drinking motives may provide important content for alcohol intervention; clinical trials could indicate whether inclusion of such content improves intervention efficacy. Discussing motives in session could help providers assist clients in better managing psychological and social aspects of their lives without reliance on alcohol.

Keywords HIV · Drinking · Alcohol · Motives

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Introduction

Over 1.1 million people in the US [1] and 34.2 million people worldwide [2] now live with HIV. Antiretroviral (ART) medications have substantially improved prognosis for individuals with HIV [3], leading HIV to be re-categorized as a chronic disease in countries with access to ART medication [4]. However, the successes of ART medication—and the associated changes in the causes of mortality among individuals with HIV—have brought attention to the role of alcohol in the health of this population in several ways. First, liver disease has emerged as a leading contributor to morbidity and mortality among HIV-positive individuals [5, 6]. Alcohol damages the liver [7], and alcohol use disorders are found in the majority of HIV-positive patients dying of liver disease [8]. Patients with HIV and hepatitis co-infection have particularly vulnerable livers [9], as their hepatitis progresses more quickly due to HIV [10, 11], leading to elevated rates of liver fibrosis and cirrhosis [10, 12–15] and hepatocellular carcinoma [11, 14, 15]. A second reason that alcohol is dangerous for this population is because HIV-positive individuals with alcohol use disorders have lower ART medication adherence [16], and some patients intentionally skip ART medication when drinking heavily [17–20]. Missing ART medication doses clearly reduces the beneficial effects of these life-saving medications. Third, alcohol decreases immune functioning, which can accelerate disease progression [21]. Several recent studies found drinking to be associated with

increased viral load and decreased CD4 cell count in those with HIV [22]. Further, in addition to harming the individual with HIV, drinking is associated with unprotected sex in individuals with and without HIV [23, 24], which increases transmission of the disease. Due to the myriad risks associated with drinking among individuals with HIV, understanding the reasons for drinking despite these risks may offer important information for better clinical management, and the design of more effective evidence-based interventions.

An extensive literature exists on drinking motives in non-HIV populations [25]. This work is based on the "motivational model of alcohol use," a theory positing that alcohol consumption is a function of the anticipated positive consequences of drinking [26]. Drinking motive scales generally cover three domains: drinking to cope with negative emotions, drinking to enhance experience, and drinking to navigate social situations (which can include social facilitation or conformity motives) [25]. Many studies on drinking motives focus on students [25]. However, adult populations have also been studied. For example, the reasons for drinking scale [27] has been shown to predict alcohol involvement in adult heavy drinkers in the general population, both cross-sectionally [27] and prospectively [28, 29]. In addition, drinking motives have been shown to predict drinking quantity in a large study of alcoholism patients [30].

The knowledge base on drinking motives has not yet been applied in primary care settings, where intervention with patients who face significant medical consequences of heavy alcohol use is particularly relevant. Primary care settings are an important point of intervention for drinking problems [31–33]. The success of motivational interviewing (MI) for drinking reduction in primary care [34] highlights the potential importance of motivational factors as an aspect of drinking reduction in this setting. However, whether drinking motives predict drinking among primary care patients is, as yet, undetermined.

Among individuals with HIV/AIDS, most studies of drinking motives have focused specifically on drinking as relevant to sexual situations [35–39]. One additional study investigated PTSD, an opioid receptor gene, and general drinking motives among individuals with HIV [40]. However, this study did not address whether the drinking motivational model was applicable to this population, or whether the drinking motive domains were associated with drinking behaviors. Understanding the applicability of the drinking motives model, and the relationship of its domains to drinking patterns in HIV primary care patients could provide information leading to more effective drinking reduction interventions. Effective drinking reduction interventions are needed in HIV primary care [41], and may be crucial to the survival of some HIV patients.

The purpose of the present study is therefore to assess the structure of drinking motives in an HIV primary care population, and the associations of these drinking motives with indicators of drinking and heavy drinking. We accomplish this in two steps. First, we assess the factor structure of the reasons for drinking scale [27] in this population, as well as internal consistency of subscales and correlations among the subscales. We then investigate the associations between drinking motives and alcohol consumption patterns.

Methods

Participants

Participants were 254 HIV-positive adults aged 22–68 (M = 45.7; SD = 8.1) who were receiving treatment at a large urban HIV primary care clinic in the northeastern US [42]. Participants were enrolled in a randomized comparative efficacy trial of brief drinking-reduction interventions. Inclusion criteria for this trial required drinking at least four drinks on one occasion in the 30 days prior to assessment. All procedures were approved by institutional review boards at Columbia University, St. Vincent's Hospital, and Mt. Sinai Medical Center. The present study was based on assessments conducted in English or Spanish via audio computer-assisted self-interview, after consent and randomization, but before initial intervention. As shown in Table 1, most participants were male, African American or Hispanic, and the majority had completed at least high school or a graduate equivalency degree. Most elected to complete the study in English, with about a fifth of the sample completing it in Spanish. The median income range of participants in the study was $8,000–9,999. Participants had been living with HIV for over a decade, on average, and most were taking HIV medication. Few participants had injected drugs in the past month. Of the men who reported having sex in the past month, nearly half had had sex with men.

Measures

Drinking Motives

Drinking motives were assessed using the reasons for drinking scale [27]. Participants responded to 23 reasons for drinking in four content domains: drinking to cope with negative affect ("COPE"; 6 items), drinking for enjoyment ("ENJOYMENT"; 4 items), drinking for social facilitation ("SOCIAL-FACILITATION"; 7 items), and drinking in response to social pressure ("SOCIAL-PRESSURE"; 6 items). Participants rated their agreement with each reason

Table 1 Demographics, HIV information, and drinking behaviors for full sample and by gender

	Male (n = 198)	Female (n = 56)	Total (N = 254)
Demographics			
Age: M (SD)	45.7 (8.5)	45.6 (6.5)	45.7 (8.1)
Ethnicity: %African American/%Hispanic/%White	47.5/48.0/4.6	57.1/33.9/8.9	49.6/44.9/5.5
Education: %completed high school/GED	60.9	48.2	58.1
Language of study completion: %Spanish	24.2	8.9	20.9
Personal income: median category	$8,000–9,999	$8,000–9,999	$8,000–9,999
HIV information			
% on HIV medication	77.7	75.0	77.1
Years since HIV diagnosis: M (SD)	12.6 (7.8)	13.4 (6.8)	12.8 (7.6)
%Using injection drugs in past month	2.0	1.8	2.0
%Men having sex with men (of n = 107 men reporting past-month sexual activity)	43.0	n/a	n/a
Alcohol consumption			
Drinks/drinking day: M (SD)	6.0 (3.5)	4.7 (3.4)	5.7 (3.5)
Frequency[a] (1 = never; 11 = every day): M (SD)	8.8 (1.8)	8.6 (1.7)	8.7 (1.8)
Maximum drinks/day: M (SD)	11.8 (6.4)	9.5 (5.9)	11.3 (6.4)
Binge frequency[a] (1 = never; 11 = every day): M (SD)	7.4 (2.9)	7.9 (1.7)	7.5 (2.7)
Intoxication frequency[a] (1 = never; 11 = every day): M (SD)	6.8 (2.6)	6.8 (2.9)	6.8 (2.6)

Some information published previously in [42]

[a] Frequency response options indicate: 1 = never, 2 = 1–2 times in the last year, 3 = 3–6 times in the last year, 4 = 7–11 times in the last year, 5 = once a month, 6 = 2–3 times a month, 7 = once a week, 8 = 2 times a week, 9 = 3–4 times a week, 10 = nearly every day, 11 = every day

on a five-point scale (1 = agree strongly; 5 = disagree strongly). The reasons for drinking scale has demonstrated a four-factor structure in previous research [27], with concurrent and predictive validity demonstrated via associations with alcohol use and alcohol use disorder variables [27–29, 43].

Alcohol Consumption

Participants reported on past-year alcohol consumption using the alcohol use disorder and associated disabilities interview schedule (AUDADIS). The AUDADIS alcohol consumption items are consistent with international guidelines developed to maximize validity of measurement [44], and have demonstrated good-to-excellent test–retest reliability in the U.S. general population [45], among substance abuse and psychiatric patients [46], and among Latino primary care patients [47]. The AUDADIS has been used to study alcohol consumption in heavy-drinking community samples [48], and in the general population in the US and other countries [49–52]. Participants reported on typical quantity (number of drinks consumed on a typical drinking day). Typical drinking frequency (as well as other frequency measures) was rated using an 11-point frequency scale (1 = every day, 2 = nearly every day, 3 = 3–4 times a week, 4 = 2 times a week, 5 = once a week, 6 = 2–3 times a month, 7 = once a month, 8 = 7–11 times in the last year, 9 = 3–6 times in the last year, 10 = 1–2 times in the last year, 11 = never; scale

reversed in descriptive information presented in tables for ease of interpretation). Three measures of heavy drinking were also assessed. Maximum quantity was the largest number of drinks consumed on a single day. Binge frequency was rated by assessing the frequency at which men consumed five or more drinks in one day, and women consumed four or more (these levels exceed published low-risk drinking limits; [53]). Frequency of intoxication was assessed by asking how often participants drank enough to feel intoxicated or drunk (as characterized by slurred speech, unsteadiness, blurred vision). In addition to the AUDADIS, participants reported recent quantity and frequency using the 30-day Timeline Followback (Sobell 1995). Variables of interest were drinks per drinking day (comparable to AUDADIS typical quantity measure) and percent days abstinent (comparable to AUDADIS typical frequency measure). However, as the primary interest in the current study was drinking patterns of longer standing, these data were used only for sensitivity analyses.

Demographic and HIV Information

Participants reported their age, ethnicity, gender, highest level of education, and income. Preferred language for study completion (English or Spanish) was confirmed and documented by the bilingual study counselors. HIV variables included whether patients were prescribed HIV medication and the number of years since their initial HIV diagnosis. We also assessed HIV risk behaviors (injection

drug use, men having sex with men) in the past 30 days using the AIDS risk assessment scale [54], and whether patients had taken all of their medication in the past four days using a 4-day adaptation of the Adult AIDS clinical trials group adherence instruments [55].

Data Analysis

First, we tabulated basic descriptive information (demographics, HIV information, drinking patterns) for the full sample and for males and females separately (as differential alcohol metabolism was expected to result in differential drinking patterns [56]). We tested whether drinking differed by gender, and also explored differences by age, education, ethnicity, language of study completion, and income using non-parametric Kruskal–Wallis tests [dichotomizing count variables via median split (age, income) and high school graduation status (education)]. We also tested whether drinking predicted recent medication adherence (as defined by any missed doses in the last four days), again using non-parametric Kruskal–Wallis tests. Second, a confirmatory factor analysis was conducted to determine whether the factor structure of the reasons for drinking scale was consistent with factors specified in previous research. A model with the four original factors [27] was specified and tested for fit. Good fit is indicated by a CFI of at least 0.95 and an RMSEA under 0.10, preferably under 0.06 [57]. To obtain adequate fit, the scale was adjusted with the simultaneous goals of improving fit and keeping subscale content consistent with previous research. Third, the new scales were evaluated. Subscales were assessed for internal consistency using Cronbach's alphas. Once subscale content was confirmed, we created subscale scores. To do this, we summed responses within each category, then reversed subscale scores (so that larger values indicated higher motives). We assessed the magnitude to which subscales were interrelated, using Cohen's guidelines for small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$) correlations [58]. Associations of motives with demographics and adherence were explored. Fourth, using these motive subscale scores, we examined the relationship of the drinking motives to the varied measures of alcohol consumption. We constructed a generalized linear model for each drinking outcome variable using SAS PROC GENMOD [59] with the motives specified as predictors, and demographic and HIV-related variables included as covariates (age, ethnicity, gender, education, preferred language, HIV medication status, number of years since diagnosis). These models specified the negative binomial or Poisson distributions of the alcohol consumption variables, depending on the distribution of the outcome variable included in the model. Although analyses are conducted on continuous

motive data, drinking patterns for individuals scoring low and high on each motive subscale are presented for descriptive purposes.

Results

Description of Sample

The sample evidenced heavy drinking patterns (see Table 1). They reported typical and maximum consumption during the last 12 months of 5.7 (SD = 3.5) and 11.3 (SD = 6.4) drinks per drinking day, respectively. Median frequency of drinking was 3–4 times per week, binge frequency was twice per week, and intoxication frequency was once per week.

Analyses of Drinking by Demographics and Adherence

Separate alcohol consumption (and other descriptive) information for men and women is available in Table 1. As expected, men drank more than women on both typical (Kruskal–Wallis [K–W] X^2 [1] = 9.93, $p < 0.01$) and maximum (K–W X^2 [1] = 7.09, $p < 0.01$) occasions, but none of the frequency variables differed significantly ($ps > 0.50$).

Exploratory analyses also indicated some differences in drinking by other demographic characteristics (for descriptive information by status on all demographic variables please see Supplemental Table 1). Specifically, younger participants drank more per occasion (K–W X^2 [1] = 6.67, $p < 0.01$), and those with more education binged less frequently (K–W X^2 [1] = 4.55, $p < 0.05$). African Americans drank fewer drinks per occasion than White and Hispanic participants (K–W [2] = 7.97, $p < 0.05$). Compared to English-speaking participants, Spanish-speaking participants reported higher quantity (K–W X^2 [1] = 9.91, $p < 0.01$), but lower frequency (K–W X^2 [1] = 5.73, $p < 0.05$) and intoxication frequency (K–W X^2 [1] = 5.46, $p < 0.05$).

Relatively few participants in the current sample (15.9 %) reported missing any medication in the past four days. A recent missed dose was not predicted by any measure of alcohol consumption ($ps > 0.40$).

Factor Analysis

A confirmatory factor analysis specifying the four original factors indicated fit that did not meet recommended guidelines (CFI = 0.933, RMSEA = 0.082). Standardized parameter estimates suggested that ENJOYMENT had a weaker factor structure than the other factors. A three-factor model (omitting the items from the ENJOYMENT factor) achieved adequate fit (CFI = 0.954, RMSEA = 0.080). To

further ensure that a four-factor model was not more appropriate, an exploratory factor analysis was also run on the data, which also indicated three factors. Thus, the COPE, SOCIAL-FACILITATION, and SOCIAL-PRESSURE factors were retained for further analyses.

Internal Consistency and Inter-factor Correlations

Cronbach's alphas were ascertained to determine internal consistency. The alphas indicated good-to-excellent internal consistency for COPE ($\alpha = 0.78$), SOCIAL-FACILITATION ($\alpha = 0.88$), and SOCIAL-PRESSURE ($\alpha = 0.85$) motives. Internal consistency for ENJOYMENT was substantially lower than the other motives ($\alpha = 0.57$). This confirmed our earlier conclusion that ENJOYMENT was weaker than the other factors, and supported our decision to omit it from further analyses. Correlations among COPE, SOCIAL-FACILITATION, and SOCIAL-PRESSURE motives were of medium to large magnitude ($rs = 0.32–0.47$), indicating that the factors were associated but that each still provided unique information.

Relationship of Motives to Demographics and Adherence

Some differences in motives by demographic status emerged (see Supplemental Table 1). Specifically, Hispanic patients drank more due to social pressure than patients of other ethnicities (K–W X^2 [2] = 6.74, $p < 0.05$), and Spanish-speaking patients drank more for this motive than English-speaking patients (K–W X^2 [1] = 22.26, $p < 0.0001$). Recent adherence was unrelated to all motives ($ps > 0.10$).

Relationship of Motives to Drinking Indicators

Higher scores on COPE were associated with heavier alcohol involvement using all drinking variables, including drinking quantity ($B = 0.0184$, $X^2 = 6.04$, $p < 0.05$), frequency ($B = -0.0283$, $X^2 = 14.43$, $p < 0.001$), maximum quantity ($B = 0.0203$, $X^2 = 7.77$, $p < 0.01$), binge frequency ($B = -0.0306$, $X^2 = 23.21$, $p < 0.0001$), and intoxication frequency ($B = -0.0177$, $X^2 = 8.92$, $p < 0.01$). As shown in Table 2, individuals scoring above (versus at or below) the median COPE score reported drinking one more drink on a typical drinking day, and more than two more drinks on their heaviest drinking day. Frequency values (6 = 2–3 times a month, 7 = once a week, 8 = 2 times a week, 9 = 3–4 times a week, 10 = nearly every day) indicated more frequent drinking for individuals scoring above the median in COPE (9.08) than those scoring lower on COPE (8.42). Individuals above the median on COPE reported higher average binge drinking frequency (8.03) and intoxication

frequency (7.29) rates than individuals lower on COPE (7.00 and 6.33, respectively).

Higher scores on SOCIAL-FACILITATION were associated with higher frequency of drinking to intoxication ($B = -0.0092$, $X^2 = 4.84$, $p < 0.05$). Intoxication frequency values (6 = 2–3 times a month, 7 = once a week, 8 = 2 times a week) for individuals above the median on SOCIAL-FACILITATION were 7.37, representing more frequent intoxication than those low on SOCIAL-FACILITATION (6.24).

Higher scores on SOCIAL-PRESSURE were associated with lower quantity ($B = -0.0187$, $X^2 = 5.24$, $p < 0.05$) and binge frequency ($B = 0.0237$, $X^2 = 11.45$, $p < 0.001$). Individuals scoring high on SOCIAL-PRESSURE reported drinking a third of a drink less on a typical drinking day. Their frequency of binge drinking (7 = once a week, 8 = 2 times a week) was also lower (frequency value 7.15) than those low on SOCIAL-PRESSURE (7.70).

As a sensitivity analysis, we analyzed the associations between drinking motives and recent alcohol consumption (as measured by the 30-day Timeline Followback). Higher scores on COPE were associated with higher drinking frequency (fewer days abstinent; $B = -0.0158$, $X^2 = 4.78$, $p < 0.05$); the association with quantity was in the expected direction (higher coping predicting higher drinking) but nonsignificant ($B = 0.0091$, $X^2 = 1.82$, $p = 0.18$). The association between SOCIAL-PRESSURE and drinks per drinking day was also nonsignificant ($B = -0.0018$, $X^2 = 0.06$, $p = 0.80$), but the direction was negative, again consistent with the AUDADIS measure.

Discussion

This study is the first to assess the associations between drinking motives and drinking in an HIV-positive primary care sample. Findings indicated support for three of the four original subscales of the reasons for drinking scale [27]. Further, in this HIV-positive sample, drinking motives were significantly associated with a number of alcohol consumption indicators. In particular, the coping motive was strongly and consistently associated with more drinking and heavy drinking. However, different social factors had different effects. The social facilitation motive was associated with more frequent drinking to intoxication. In contrast, social pressure was actually associated with drinking less and binge drinking less frequently.

Consistent with previous literature using the RDS in the general population [27–29, 43], the RDS subscales were associated with drinking in this heavily drinking HIV-positive sample. Also consistent with research in the general population [27, 29], coping showed the most robust associations with the most serious outcomes. The current

Table 2 Drinking among HIV primary care patients scoring below and above the median on three drinking motive scales [means (SDs)]

Below/above median motive score	Drinks/drinking day		Frequency[a] (1 = never; 11 = every day)		Maximum drinks/day		Binge frequency[a] (1 = never; 11 = every day)		Intoxication frequency[a] (1 = never; 11 = every day)	
	At/below	Above	At/below	Above	At/below	Above	At/below	Above	At/below	Above
Drinking to cope with negative affect	5.22 (3.50)	6.20* (3.42)	8.42 (1.84)	9.08*** (1.70)	10.20 (5.91)	12.50** (6.73)	7.00 (2.88)	8.03*** (2.48)	6.33 (2.83)	7.29** (2.33)
Drinking for social facilitation	5.54 (3.72)	5.84 (3.24)	8.53 (1.83)	8.94 (1.75)	10.87 (6.59)	11.74 (6.19)	7.31 (2.78)	7.68 (2.70)	6.24 (2.83)	7.37* (2.31)
Drinking in response to social pressure	5.82 (3.69)	5.46* (3.14)	8.84 (1.80)	8.55 (1.79)	11.55 (6.43)	10.86 (6.35)	7.70 (2.56)	7.15*** (3.00)	6.74 (2.79)	6.86 (2.40)

* Indicates that generalized linear models presented in results section were significant at $p < 0.05$; ** indicates $p < 0.01$; *** indicates $p < 0.001$

[a] Frequency response options indicate: 1 = never, 2 = 1–2 times in the last year, 3 = 3–6 times in the last year, 4 = 7–11 times in the last year, 5 = once a month, 6 = 2–3 times a month, 7 = once a week, 8 = 2 times a week, 9 = 3–4 times a week, 10 = nearly every day, 11 = every day

study also complements and expands on research that has identified specific expectancies about the effects of alcohol on sexual experience as predictors of alcohol involvement in HIV samples [35–37] by assessing a broader array of motives also relevant to drinking in this population. Findings from the present study confirm the relevance of the drinking motives model in this population, specify its factor structure among individuals with HIV, and provide differentiations in motives among those who drink heavily (coping, social facilitation), and those who do not drink as much (social pressure).

Study limitations are noted. First, the current study consists of HIV-positive adults within one large urban HIV primary care clinic in the northeastern United States. The generalizability of these results to a broader range of HIV-infected individuals should be investigated, especially given the relatively small proportions of female and White participants, and the heavy drinking behavior of the sample. Yet, the sizeable representation of patients from minority groups over-represented in the HIV epidemic may in actuality yield results more characteristic of the HIV-infected population as a whole. Second, the patients' route of HIV infection was not available in the current study, which could have provided useful descriptive information for the current sample. Third, given the strong results for the coping scale, determining if this factor interacts with major depressive disorder in a meaningful way could be informative; however, these data were not available in the present study. As a proxy for a depressive disorder, scores on a depression screening measure (the Beck Depression Inventory) were analyzed; the scale evidenced no (multiplicative or additive) interactions with the coping motive. Fourth, associations are cross-sectional, and thus cannot be used to make conclusions regarding causation. Given the promising findings of the current study, prospective studies that could provide evidence of temporal sequence more indicative of causation would be valuable; such analyses are underway by the present authors.

Several strengths of the current study are also noted. First, this study utilized strong measures that have been supported in prior research, including the AUDADIS. The Reasons for Drinking Scale has also been validated in earlier studies. Although other drinking motive scales exist, most motives scales address a small number of motives consistent in content with those assessed in the current study [25]. Analysis of factor structure and internal consistency of the RDS in this study supported three motives subscales as appropriate for this population. Second, the current study was successful in recruiting heavily drinking patients, for whom intervention was most warranted, and for whom drinking motives are arguably most relevant. This was done by only including participants with at least one heavy drinking episode in the prior month. The

strategy did indeed yield a heavily drinking sample. National survey data suggests that only 21.63 % of the general population in northeastern urban areas exceed daily drinking levels of 4 drinks for men and 3 for women, and only 13.50 % exceed weekly drinking levels of 13 drinks for men and 6 for women [60]. In contrast, our study participants reported drinking an average of 5.7 drinks per occasion 3–4 times per week. Third, validation of this scale for use among individuals with HIV yields a concrete tool for use in HIV-positive clinical settings. Administration of the RDS could quickly identify reasons for heavy use, facilitating brief targeted intervention or referral for specialized treatment. Improving intervention quality for heavily drinking individuals with HIV is important, as research has shown that patients with unhealthy alcohol use in HIV primary care rate communication with providers as worse than those with healthy alcohol use patterns [61].

In summary, the current study expands our understanding of why HIV-positive primary care heavy drinkers drink despite elevated risks to their health. It also indicates that social pressure may be more relevant for lighter drinkers, with the social pressure likely coming from more heavily drinking peers. Drinking to cope served as a strong predictor of all drinking indicators, suggesting that this motive is an important factor to address in drinking reduction interventions in medical settings, even in the absence of a diagnosis of major depressive disorder. Drinking for social facilitation was associated with more frequent drinking to intoxication; individuals high in this motive may believe that intoxication is necessary to achieve effective socialization. However, the social pressure motive was associated with slightly lower drinking levels; the directionality of this association should be considered carefully. Although higher levels of social pressure are associated with lower levels of drinking, this does not mean that social pressure *causes* less drinking; in contrast, it is likely that these lower-drinking individuals are more at risk for social pressure. Perhaps individuals who drink in response to social pressure are not as internally driven to drink (as reflected by their lower drinking levels despite social pressure), and only drink as much as they do because of social pressure. This suggests that coaching on ways to resist social pressure may be a useful intervention strategy for those who drink due to this motive. In contrast, for individuals who drink to cope or for social facilitation, interventions targeted toward identifying alternative ways to achieve these goals may be useful, suggesting future directions for studies on whether these strategies are effective components of alcohol interventions for HIV patients. These findings also have implications for counselors and health educators using different evidence based interventions. Counselors and health educators using motivational interviewing might discuss these topics (coping, drinking to facilitate socialization, drinking in response to social pressure) in the context of decisional balance. This would involve helping the client verbalize their reasons for drinking while the therapist also prompts acknowledgment of the consequences of drinking. Cognitive behavioral therapists could also benefit from discussion of coping, social facilitation, and social pressure motives, likely in the context of triggers of drinking. Identification of motives that serve as triggers for drinking could facilitate discussion of how to respond to these triggers without use of alcohol. Individuals clearly vary in their reasons for drinking. This study begins to provide information to better understand and intervene with heavy drinking among HIV-infected individuals based on their motives for drinking.

References

1. Centers for Disease Control and Prevention. HIV in the United States: at a glance. 2012. http://www.cdc.gov/hiv/resources/factsheets/us.htm.
2. World Health Organization. Global summary of the AIDS epidemic. 2011. http://www.who.int/hiv/data/2012_epi_core_en.png.
3. Centers for Disease Control and Prevention. Basic information about HIV and AIDS 2012. http://www.cdc.gov/hiv/topics/basic/index.htm. Accessed July 2012.
4. Scandlyn J. When AIDS became a chronic disease. West J Med. 2000;172(2):130–3 PubMed PMID: WOS:000085217100024. English.
5. Antiretroviral Therapy Cohort C. Causes of death in HIV-1-infected patients treated with antiretroviral therapy, 1996–2006: collaborative analysis of 13 HIV cohort studies. Clin Infect Dis. 2010;50(10):1387–96 PubMed PMID: 20380565. Pubmed Central PMCID: 3157754.
6. Palella FJ Jr, Baker RK, Moorman AC, Chmiel JS, Wood KC, Brooks JT, et al. Mortality in the highly active antiretroviral therapy era: changing causes of death and disease in the HIV outpatient study. J Acquir Immune Defic Syndr. 2006;43(1):27–34 PubMed PMID: 16878047.
7. National Institute on Alcohol Abuse and Alcoholism. Alcohol's effects on the body, 2012. http://www.niaaa.nih.gov/alcohol-health/alcohols-effects-body. Accessed 21 July 2013.
8. DeLorenze GN, Weisner C, Tsai AL, Satre DD, Quesenberry CP Jr. Excess mortality among HIV-infected patients diagnosed with substance use dependence or abuse receiving care in a fully integrated medical care program. Alcohol Clin Exp Res. 2011;35(2):203–10 PubMed PMID: 21058961. Pubmed Central PMCID: 3242701.
9. Barve S, Kapoor R, Moghe A, Ramirez JA, Eaton JW, Gobejishvili L, et al. Focus on the liver: alcohol use, highly active antiretroviral therapy, and liver disease in HIV-infected patients. Alcohol Res Health. 2010;33(3):229–36 PubMed PMID: WOS:000282858200007. English.

10. Kirk GD, Mehta SH, Astemborski J, Galai N, Washington J, Higgins Y, et al. HIV, age, and the severity of hepatitis C virus-related liver disease: a cohort study. Ann Intern Med. 2013;158(9):658–66 PubMed PMID: 23440167.

11. Curry MP. HIV and hepatitis C virus: special concerns for patients with cirrhosis. J Infect Dis. 2013;207(Suppl 1):S40–4 PubMed PMID: 23390304.

12. Andreoni M, Giacometti A, Maida I, Meraviglia P, Ripamonti D, Sarmati L. HIV–HCV co-infection: epidemiology, pathogenesis and therapeutic implications. Eur Rev Med Pharmacol Sci. 2012;16(11):1473–83 PubMed PMID: 23111959.

13. Muga R, Sanvisens A, Fuster D, Tor J, Martinez E, Perez-Hoyos S, et al. Unhealthy alcohol use, HIV infection and risk of liver fibrosis in drug users with hepatitis C. PloS One. 2012;7(10):e46810 PubMed PMID: 23056462. Pubmed Central PMCID: 3467291.

14. Puoti M, Moioli MC, Travi G, Rossotti R. The burden of liver disease in human immunodeficiency virus-infected patients. Semin Liver Dis. 2012;32(2):103–13 PubMed PMID: 22760649.

15. Ioannou GN, Bryson CL, Weiss NS, Miller R, Scott JD, Boyko EJ. The prevalence of cirrhosis and hepatocellular carcinoma in patients with human immunodeficiency virus infection. Hepatology. 2013;57(1):249–57 PubMed PMID: 22532055.

16. Azar MM, Springer SA, Meyer JP, Altice FL. A systematic review of the impact of alcohol use disorders on HIV treatment outcomes, adherence to antiretroviral therapy and health care utilization. Drug Alcohol Depend. 2010;112(3):178–93 PubMed PMID: 20705402. Pubmed Central PMCID: 2997193.

17. Kenya S, Chida N, Jones J, Alvarez G, Symes S, Kobetz E. Weekending in PLWH: alcohol use and ART adherence, a pilot study. AIDS Behav. 2013;17(1):61–7 PubMed PMID: 22961583.

18. Kalichman SC, Amaral CM, White D, Swetsze C, Kalichman MO, Cherry C, et al. Alcohol and adherence to antiretroviral medications: interactive toxicity beliefs among people living with HIV. J Assoc Nurses AIDS Care. 2012;23(6):511–20 PubMed PMID: 22421097.

19. Kalichman SC, Amaral CM, White D, Swetsze C, Pope H, Kalichman MO, et al. Prevalence and clinical implications of interactive toxicity beliefs regarding mixing alcohol and antiretroviral therapies among people living with HIV/AIDS. AIDS Patient Care STDs. 2009;23(6):449–54 PubMed PMID: 19413503. Pubmed Central PMCID: 2856434.

20. Kalichman SC, Grebler T, Amaral CM, McNerey M, White D, Kalichman MO, et al. Intentional non-adherence to medications among HIV positive alcohol drinkers: prospective study of interactive toxicity beliefs. J Gen Intern Med. 2013;28(3):399–405 PubMed PMID: 23065532.

21. Shuper PA, Neuman M, Kanteres F, Baliunas D, Joharchi N, Rehm J. Causal considerations on alcohol and HIV/AIDS—a systematic review. Alcohol Alcohol. 2010;45(2):159–66 PubMed PMID: 20061510.

22. Hahn JA, Samet JH. Alcohol and HIV disease progression: weighing the evidence. Curr HIV/AIDS Rep. 2010;7(4):226–33 PubMed PMID: 20814765. Pubmed Central PMCID: 2938419.

23. Shuper PA, Joharchi N, Irving H, Rehm J. Alcohol as a correlate of unprotected sexual behavior among people living with HIV/AIDS: review and meta-analysis. AIDS Behav. 2009;13(6):1021–36 PubMed PMID: 19618261.

24. Fritz K, Morojele N, Kalichman S. Alcohol: the forgotten drug in HIV/AIDS. Lancet. 2010;376(9739):398–400 PubMed PMID: 20650516. Pubmed Central PMCID: 3015091.

25. Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. Clin Psychol Rev. 2005;25(7):841–61 PubMed PMID: 16095785.

26. Cox WM, Klinger E. A motivational model of alcohol use. J Abnorm Psychol. 1988;97(2):168–80 PubMed PMID: 3290306.

27. Carpenter KM, Hasin DS. Reasons for drinking alcohol: relationships with DSM-IV alcohol diagnoses and alcohol consumption in a community sample. Psychol Addict Behav. 1998;12(3):168–84 PubMed PMID: WOS:000075875400002. [English].

28. Beseler CL, Aharonovich E, Hasin DS. The enduring influence of drinking motives on alcohol consumption after fateful trauma. Alcoholism Clin Exp Res. 2011;35(5):1004–10 PubMed PMID: WOS:000289896200036. [English].

29. Carpenter KM, Hasin D. A prospective evaluation of the relationship between reasons for drinking and DSM-IV alcohol-use disorders. Addict Behav. 1998;23(1):41–6 PubMed PMID: 9468741.

30. Doyle SR, Donovan DM, Simpson TL. Validation of a nine-dimensional measure of drinking motives for use in clinical applications: the desired effects of drinking scale. Addict Behav. 2011;36(11):1052–60 PubMed PMID: 21782346. Pubmed Central PMCID: 3153563.

31. Babor TF, McRee BG, Kassebaum PA, Grimaldi PL, Ahmed K, Bray J. Screening, brief intervention, and referral to treatment (SBIRT): toward a public health approach to the management of substance abuse. Subst Abus. 2007;28(3):7–30 PubMed PMID: 18077300.

32. Kaner EF, Beyer F, Dickinson HO, Pienaar E, Campbell F, Schlesinger C, et al. Effectiveness of brief alcohol interventions in primary care populations. Cochrane Database Syst Rev. 2007;18(2):CD004148. doi:10.1002/14651858.CD004148.pub3.

33. Whitlock EP, Polen MR, Green CA, Orleans T, Klein J, Force USPST. Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: a summary of the evidence for the U.S. preventive services task force. Ann Intern Med. 2004;140(7):557–68 PubMed PMID: 15068985.

34. Bertholet N, Daeppen JB, Wietlisbach V, Fleming M, Burnand B. Reduction of alcohol consumption by brief alcohol intervention in primary care: systematic review and meta-analysis. Arch Intern Med. 2005;165(9):986–95 PubMed PMID: 15883236.

35. Maisto SA, McGinnis K, Cook R, Conigliaro J, Bryant K, Justice AC. Factor structure of Leigh's (1990) alcohol sex expectancies scale in individuals in treatment for HIV disease. AIDS Behav. 2010;14(1):174–80 PubMed PMID: 18791863. Pubmed Central PMCID: 3032495.

36. Kalichman SC, Weinhardt L, DiFonzo K, Austin J, Luke W. Sensation seeking and alcohol use as markers of sexual transmission risk behavior in HIV-positive men. Ann Behav Med. 2002;24(3):229–35 PubMed PMID: 12173680.

37. Bimbi DS, Nanin JE, Parsons JT, Vicioso KJ, Missildine W, Frost DM. Assessing gay and bisexual men's outcome expectancies for sexual risk under the influence of alcohol and drugs. Subst Use Misuse. 2006;41(5):643–52 PubMed PMID: 16603452.

38. Parsons JT, Bimbi DS. Intentional unprotected anal intercourse among sex who have sex with men: bare backing-from behavior to identity. AIDS Behav. 2007;11(2):277–87 PubMed PMID: 16775771.

39. Boscarino JA, Avins AL, Woods WJ, Lindan CP, Hudes ES, Clark W. Alcohol-related risk factors associated with HIV infection among patients entering alcoholism treatment: implications for prevention. J Stud Alcohol. 1995;56(6):642–53 PubMed PMID: 8558896.

40. Nugent NR, Lally MA, Brown L, Knopik VS, McGeary JE. OPRM1 and diagnosis-related posttraumatic stress disorder in binge-drinking patients living with HIV. AIDS Behav. 2012;16(8):2171–80 PubMed PMID: 22143634.

41. Hutton HE, McCaul ME, Chander G, Jenckes MW, Nollen C, Sharp VL, et al. Alcohol use, anal sex, and other risky sexual behaviors among HIV-infected women and men. AIDS Behav. 2012;17(5):1694–704 PubMed PMID: 22566077.

42. Hasin DS, Aharonovich E, O'Leary A, Greenstein E, Pavlicova M, Arunajadai S, et al. Reducing heavy drinking in HIV primary care: a randomized trial of brief intervention, with and without technological enhancement. Addiction 2013;108(7):1230–1240 PubMed PMID: 23432593.

43. Beseler CL, Aharonovich E, Keyes KM, Hasin DS. Adult transition from at-risk drinking to alcohol dependence: the relationship of family history and drinking motives. Alcohol Clin Exp Res. 2008;32(4):607–16 PubMed PMID: 18341650.

44. Dawson DA, Room R. Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: the Skarpo conference overview. J Subst Abuse. 2000;12(1–2):1–21 PubMed PMID: 11288465.

45. Grant BF, Dawson DA, Stinson FS, Chou PS, Kay W, Pickering R. The alcohol use disorder and associated disabilities interview schedule-IV (AUDADIS-IV): reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. Drug Alcohol Depend. 2003;71(1):7–16 PubMed PMID: 12821201.

46. Hasin D, Carpenter KM, McCloud S, Smith M, Grant BF. The alcohol use disorder and associated disabilities interview schedule (AUDADIS): reliability of alcohol and drug modules in a clinical sample. Drug Alcohol Depend. 1997;44(2–3):133–41 PubMed PMID: 9088785.

47. Canino G, Bravo M, Ramirez R, Febo VE, Rubio-Stipec M, Fernandez RL, et al. The Spanish alcohol use disorder and associated disabilities interview schedule (AUDADIS): reliability and concordance with clinical diagnoses in a Hispanic population. J Stud Alcohol. 1999;60(6):790–9 PubMed PMID: 10606491.

48. Hasin D, Van Rossem R, McCloud S, Endicott J. Alcohol dependence and abuse diagnoses: validity in community sample heavy drinkers. Alcohol Clin Exp Res. 1997;21(2):213–9 PubMed PMID: 9113255.

49. Shmulewitz D, Wall MM, Keyes KM, Aharonovich E, Aivadyan C, Greenstein E, et al. Alcohol use disorders and perceived drinking norms: ethnic differences in Israeli adults. J Stud Alcohol Drugs. 2012;73(6):981–90 PubMed PMID: 23036217. Pubmed Central PMCID: 3469051.

50. Caetano R, Baruah J, Ramisetty-Mikler S, Ebama MS. Sociodemographic predictors of pattern and volume of alcohol consumption across Hispanics, Blacks, and Whites: 10-year trend (1992–2002). Alcoholism Clin Exp Res. 2010;34(10):1782–92 PubMed PMID: 20645935. Pubmed Central PMCID: 2957880.

51. Moss HB, Chen CM, Yi HY. Prospective follow-up of empirically derived alcohol dependence subtypes in wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC): recovery status, alcohol use disorders and diagnostic criteria, alcohol consumption behavior, health status, and treatment seeking. Alcohol Clin Exp Res. 2010;34(6):1073–83 PubMed PMID: 20374206.

52. Dawson DA, Grant BF, Chou SP, Pickering RP. Subgroup variation in U.S. drinking patterns: results of the 1992 national longitudinal alcohol epidemiologic study. J Subst Abuse. 1995;7(3):331–44 PubMed PMID: 8749792.

53. National Institute on Alcohol Abuse and Alcoholism. What's "low-risk" drinking? 2012. http://rethinkingdrinking.niaaa.nih.gov/IsYourDrinkingPatternRisky/WhatsLowRiskDrinking.asp.

54. Joe G, Simpson D. Needle use risks: composite measures and comparisons. In: Brown B, Beschner G, editors. Handbook on risk of AIDS: injection drug users and sexual partners. Westport: Greenwood Press; 1995. p. 137–54.

55. Chesney MA, Ickovics JR, Chambers DB, Gifford AL, Neidig J, Zwickl B, et al. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG adherence instruments. Patient Care Committee & Adherence Working Group of the Outcomes Committee of the Adult AIDS Clinical Trials Group (AACTG). AIDS Care. 2000;12(3):255–66 PubMed PMID: 10928201.

56. Alcoholism NIoAAa. Women and Alcohol 2011. http://pubs.niaaa.nih.gov/publications/womensfact/womensFact.pdf. Accessed 7 June 2013.

57. Tabachnick BG, Fidell LS. Using multivariate statistics, vol. xxviii. 5th ed. Washington, DC: Boston: Pearson/Allyn & Bacon; 2007.

58. Cohen J. A power primer. Psychol Bull. 1992;112(1):155–9 PubMed PMID: 19565683.

59. SAS Institute Inc. SAS/STAT, Version 9.3. Cary, NC: SAS Institute Inc.; 2011.

60. Borders TF, Booth BM. Rural, suburban, and urban variations in alcohol consumption in the United States: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. J Rural Health. 2007;23(4):314–21 PubMed PMID: 17868238.

61. Korthuis PT, Saha S, Chander G, McCarty D, Moore RD, Cohn JA, et al. Substance use and the quality of patient–provider communication in HIV clinics. AIDS Behav. 2011;15(4):832–41 PubMed PMID: 20703792. Pubmed Central PMCID: 3077450.