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Reasons for drinking as predictors of alcohol involvement one year later among HIV-infected individuals with and without hepatitis C

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Abstract

INTRODUCTION—Heavy drinking can be harmful for individuals with HIV, particularly those co-infected with hepatitis C virus (HCV). HIV patients' reasons for drinking predict short-term alcohol involvement, but whether they predict longer-term involvement is unknown. Also, it remains unknown whether these motives are differentially predictive for HIV mono-infected and HIV/HCV co-infected patients.

METHOD—HIV-infected heavy drinkers (n=254) participated in a randomized trial of brief alcohol interventions (Hasin et al., 2013), 236 (92.9%) of whom reported on baseline motives and alcohol involvement 12 months later (77.1% male, 94.9% minority, 30.6% with HCV).

RESULTS—Greater endorsement of baseline drinking to cope with negative affect predicted greater alcohol dependence symptoms at 12 months (Incident Rate Ratio [IRR] = 1.80, $p<0.05$), while greater endorsement of baseline drinking due to social pressure predicted fewer drinks consumed at 12 months (IRR = 0.67, $p<0.05$). Coping and social reasons were both predictive for HIV mono-infected patients, whereas only coping reasons were predictive for HIV/HCV co-infected patients.

DISCUSSION—Drinking for coping and social reasons predict alcohol involvement 12 months later; however, social reasons may only be important for HIV mono-infected patients. Understanding patient reasons for drinking may help predict patient risk up to a year later.

Keywords

alcohol; drinking; Hepatitis C; HIV; motives; reasons for drinking

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Introduction

Among individuals with HIV, heavy drinking increases the risk for liver damage (1), and some studies indicate that it may reduce immune function (2). Heavy drinking is also associated with decreased adherence to antiretroviral medication (3) and higher risk of unprotected sex (4), behaviors that pose risks to the patient and others. Heavy drinking is particularly risky for individuals co-infected with HIV and hepatitis C virus (HCV), as heavy drinking accelerates HCV-related liver damage (5–8), a process already expedited by HIV (9, 10). Drinking is also sometimes viewed as a contraindication for HCV treatment in HIV/HCV co-infected patients (11), limiting their treatment options. Effective interventions to reduce heavy drinking are therefore important for individuals with HIV, especially the high-risk subgroup of those with HIV/HCV co-infection. Knowledge of what motivates these populations to drink heavily can potentially be used to develop more effective interventions.

Reasons for drinking, often referred to as drinking motives, provide information on what motivates individuals to drink. Well-studied drinking motives include drinking to cope with negative affect, drinking for social facilitation, and drinking in response to social pressure (12, 13), among others. In heavily drinking HIV patients, we showed that at baseline, several reasons for drinking were associated with alcohol involvement. Specifically, patients who endorsed more drinking to cope with negative affect had higher levels of drinking and heavy drinking; those reporting more drinking for social facilitation had higher frequency of intoxication; and those reporting more drinking due to social pressure had less drinking and binge drinking (14). Further, higher scores at baseline on drinking to cope with negative affect predicted higher drinking quantity and likelihood of alcohol dependence at 60-day follow-up (15). These associations were consistent with results from previous studies in other populations, which also found drinking to cope to be strongly associated with heavy and problematic drinking, and social reasons to be associated with more moderate or lower levels of drinking (for review see (13)). However, whether these reasons for drinking predicted longer-term outcomes (e.g., drinking one year later) among HIV patients remained unknown.

As previously described, drinking may exacerbate medical problems to a greater extent in HIV/HCV co-infected patients than their HIV mono-infected counterparts, causing them more physical harm and a less optimistic prognosis (16)). Yet, whether these differences influence how these distinct groups make decisions about drinking remained unclear. Drinking to cope may occur among co-infected patients as they struggle to deal with the additional stresses of managing two serious medical conditions (both of which pose risks to morbidity and mortality). Because drinking to cope with negative affect is associated with alcohol dependence (13, 15), which can weaken the ability to cut down or stop drinking, co-infected patients who drink to cope may have less ability to control their drinking than those who do not drink for this reason. In contrast, other motives may be less influential among co-infected patients, who may not drink as readily in response to social or other more mundane (and potentially more easily resisted) triggers. However, knowledge is lacking on these relationships.

We sought to address these gaps in knowledge in two aims. First, in a sample of HIV-infected heavy drinkers, we investigated whether baseline reasons for drinking predicted alcohol consumption and dependence symptomology 12 months later. Second, we explored whether these associations differed between HIV mono-infected and HIV/HCV co-infected patients in stratified analyses. These questions were examined using data from a large alcohol reduction clinical trial in HIV primary care (17).

Patients and Methods

Patients and Procedures

The baseline sample consisted of 254 HIV-infected adult patients referred by clinic staff in a large urban HIV primary care clinic to participate in a randomized trial of the comparative efficacy of three brief alcohol interventions (17). All patients spoke English or Spanish, and reported at least one occasion of heavy drinking (four or more drinks on one occasion) in the prior 30 days. Patients participated in one of three brief alcohol interventions in English or Spanish: a DVD educational intervention, a motivational interviewing (MI) intervention, or an MI intervention plus daily self-monitoring via interactive voice response (IVR) technology, as described in detail elsewhere (17). For all three conditions, interventions were applied at the same points after recruitment into the study. This consisted of three brief in-person sessions, at baseline, 30 days, and 60 days. Contact information gathered at baseline (and updated at each session) was used to track participants. Participants received gift certificates as compensation for their participation. Of the 254 patients in the full baseline sample, 237 (93.3%) completed follow-up at end-of-study 12 months later (17), and 236 (92.9%) had full data on drinking motives and drinking; these 236 patients provided data for the current study. All patients provided informed consent, and institutional review boards at Columbia University, St Vincent's Hospital, and Mt Sinai Medical Center approved all study procedures.

Measures

Reasons for drinking. Reasons for drinking (i.e., drinking motives) were assessed at baseline using the Reasons for Drinking Scale (12). Three factors were found in previous work in this sample (14): drinking to cope with negative affect (six items; α=0.78; e.g., "I drink to avoid sadness or depression"), drinking for social facilitation (seven items; α=0.88; e.g., "Drinking makes me more outgoing with other people"), and drinking due to social pressure (six items; α=0.85; "I drink because my friends expect me to drink when we get together") (inter-factor correlations: 0.32–0.47). All subscales have demonstrated construct validity in this sample through associations with drinking reported at baseline (14), and drinking to cope with negative affect has shown predictive validity through associations with drinking and alcohol dependence at end-of-treatment (60 days later) (15). Patients rated their agreement with all reasons for drinking using a five-point Likert scale (1=agree strongly; 5=disagree strongly). For the current analyses, we utilized average scores for each subscale, which we reversed so that higher scores indicated more agreement. Average scores were used in lieu of sums so that scores would be comparable between scales of different lengths, and so that average scores were directly interpretable on the five-point Likert scale. Therefore, each patient had

three motive scores, each ranging from 1 to 5, representing their endorsement of the three different drinking motives.

Alcohol consumption. Patients reported on past 30-day alcohol consumption at baseline and 12 month follow-up using the TimeLine FollowBack (TLFB) (18) measure. The TLFB is a reliable scale (19–21) that is used widely in clinical research. We chose to use total drinks in the prior 30 days as our alcohol consumption variable (including zeros for abstainers) to maximize variability, given relatively low levels of drinking at 12 months in this sample.

Alcohol dependence symptoms. Alcohol dependence symptoms were assessed using the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS), a reliable and valid instrument (22–27) that assesses dependence symptoms according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (28). Patients were assessed for symptoms in the past 12 months at baseline, and for symptoms in the past six months at 12 months. Although 48.2% of the sample met diagnostic criteria for alcohol dependence at baseline (15, 17), only 7.2% of the sample met criteria at 12 months. Given this much lower prevalence at 12 months, and given increasing attention to the dimensionality of substance use disorder symptomology (29), we analyzed the number of alcohol dependence symptoms as our alcohol dependence outcome measure (including zeros for those with no symptoms). This AUDADIS dependence symptom count provided greater variability and more information than a dichotomous diagnosis, and research has supported its reliability (past year: intraclass correlation coefficient = 0.75–0.78) (23, 24).

Hepatitis C virus (HCV) status. HCV co-infection status was obtained from laboratory results recorded in patients' medical records.

Demographic and HIV control covariates. Patients reported on their demographic characteristics, including age (in years), sex (male or female), race (White, African American, Hispanic), and education (grade level completed). Whether they chose to complete the study in English or Spanish was recorded. Patients also reported HIV information, including medication status (positive or negative), and time since HIV diagnosis (in years).

Analysis Plan

First, descriptive information for the 236 patients analyzed in the current study is presented. We then test for differences (a) between the current sample (n=236) and those enrolled in the study but who did not have available data for the present analyses (n=18), and (b) between HCV positive (n=72) and HCV-negative (n=163) patients in the current sample. T-tests, chi squared tests, and Fisher's Exact tests were used for between-group comparisons.

For our primary analyses, we examined whether baseline reasons for drinking predicted 12-month alcohol consumption and dependence outcomes using generalized linear models. Separate models were conducted for each reason for drinking, using Proc Genmod in SAS Version 9.4 (30). Negative binomial models were specified due to the distributions of the outcome variables. Two sets of models were conducted: (a) those without any control covariates, and (b) those controlling for intervention condition and the relevant baseline

alcohol measure (total drinks or dependence symptoms), as well as age, sex, race, education, language of study completion, HIV medication status, and years since HIV diagnosis (consistent with prior work on drinking motives in this sample (14, 15)).

Finally, exploratory analyses were conducted, stratifying all controlled models by HCV co-infection status. Due to smaller sample sizes and the exploratory nature of these stratified analyses, both full and marginal significance ($p<0.10$) are interpreted.

Results

Patient Characteristics

Of the 236 patients completing the study, 77.1% were male, 94.9% minority (49.2% African American, 45.8% Hispanic), and 78.0% completed the study in English. Nearly a third (30.6%) had HIV/HCV co-infection. Patients were on average 45.5 (s.d. = 8.1) years of age, and 56.8% had completed at least a high school education. Patients had lived with HIV for an average of 12.7 (s.d.=7.5) years, and 77.1% were on HIV medication. When these 236 patients were compared to those without available motive or 12-month drinking data (n=18), there were no differences in demographic or HIV characteristics (ps>0.10). Among the 12-month sample, those co-infected with HCV were older ($t[1, 233] = -5.88$, $p<0.0001$), less educated ($t[1, 233] = 2.71$, $p<0.01$), and had longer duration of HIV infection ($t[1, 232] = -3.16$, $p<0.01$) than HIV mono-infected patients.

Primary Predictive Models

For primary predictive model results, see Table I. In uncontrolled models, higher levels of drinking to cope with negative affect predicted greater alcohol dependence symptoms at 12 months (Incidence Risk Ratio [IRR] = 1.63; 95% Confidence Interval [95% CI] = 1.06, 2.50; p=0.03), but did not predict total drinks at 12 months. Higher levels of drinking due to social pressure predicted fewer total drinks at 12 months (IRR = 0.71; 95% CI = 0.51, 0.97; p=0.03), but did not predict alcohol dependence symptoms. Drinking for social facilitation did not predict either 12-month outcome. Results were consistent when models controlled for all covariates (Table I); these more comprehensive controlled models were adapted for exploratory stratified analyses.

Exploratory analyses: HIV mono-infected versus HIV/HCV co-infected patients

When stratified by HCV co-infection status, endorsement of higher levels of drinking to cope with negative affect evidenced a larger incidence risk ratio in predicting alcohol dependence symptoms for HIV/HCV co-infected patients than for HIV mono-infected patients, although this effect was only marginally significant in this smaller sample of 72 co-infected patients (IRR=4.75; 95% CI = 0.90, 25.12; p=0.07) (Table II). The effect for HIV mono-infected patients was of more modest magnitude but significant in the relatively larger sample (IRR=1.85, 95% CI = 1.08, 3.17; p=0.02). Endorsing higher levels of drinking for social facilitation, although not predictive of total drinks in either subsample, was marginally predictive of more alcohol dependence symptoms among HIV mono-infected patients (IRR=1.56; 95% CI = 0.98, 2.48; p=0.06). In contrast, although more endorsement of drinking due to social pressure did not predict alcohol dependence symptoms in either

subsample, it did predict fewer total drinks at 12 months among HIV mono-infected patients (IRR=0.61; 95% CI = 0.41, 0.91; p=0.02).

Discussion

In this HIV-infected sample, reasons for drinking (particularly drinking to cope and drinking due to social pressure) reported by patients at baseline predicted their alcohol involvement 12 months later. These associations were found despite the passage of considerable time and their participation in alcohol-reduction interventions. This indicates that reasons for drinking are useful in predicting alcohol involvement in HIV patients even after a full year has passed, consistent with longitudinal research on motives in high-risk community samples (31). However, HIV mono-infected and HIV/HCV co-infected patients' drinking was motivated by somewhat different factors. Consistent with the additional medical challenges posed by HCV co-infection, although HIV mono-infected patients' drinking was motivated by both coping and social factors, HIV/HCV co-infected patients' drinking was motivated only by coping factors.

Patients who reported higher levels of drinking to cope with negative affect at baseline demonstrated more symptoms of alcohol dependence 12 months later. The finding that drinking to cope is associated with more intense alcohol involvement is consistent with our cross-sectional (14) and post-treatment (15) findings in this HIV-infected sample, and with the general literature on drinking motives (13). This association also helps explain findings showing links between depression and drinking (32–34), and between maladaptive coping strategies and heavy drinking (35) in HIV samples. Why only dependence symptoms (and not consumption) were elevated at 12 months among those drinking to cope is unclear, but reinforces the value of drinking to cope as an indicator of problem drinking. Stratified analyses suggested that this motive was likely relevant for both HIV mono-infected and HIV/HCV co-infected samples. That it predicted drinking even among those who faced additional medical contraindications to drinking (HIV/HCV co-infected patients) demonstrates its robustness as a predictor, and the potential importance of addressing this motive in clinical care with medically ill patients. Helping patients find alternate ways to cope with negative affect (regardless of whether the negative affect stems from medical struggles or not) may help them reduce drinking, which could have significant medical benefits for all patients with HIV, but perhaps greatest benefit for those struggling with both HIV and HCV.

Social motives were less indicative of problem drinking than coping motives. Drinking for social facilitation was not related to alcohol involvement in the full sample, consistent with our post-treatment (15) but not cross-sectional (14) studies. However, stratified analyses indicated that more endorsement of this motive may predict greater alcohol dependence symptoms in the HIV mono-infected group. The association between more endorsement of drinking due to social pressure and fewer total drinks 12 months later is consistent with our prior cross-sectional work (14) and suggests that this reason may help identify HIV-infected individuals (particularly those without HCV) who are habitually lower-risk drinkers (and who may only drink at all when socially indicated). That social motives are less indicative of problem drinking than coping motives is not only similar to our short-term findings in HIV

primary care, but also to patterns seen in other populations (13). That the predictive utility of social motives is essentially restricted to HIV mono-infected patients had not previously been demonstrated, and thus constitutes a novel finding. This finding supports the hypothesis that HIV/HCV co-infected patients' drinking may be motivated by more "severe" motives such as drinking to cope with negative affect, and that social triggers may be less influential in this group. This is intuitive, as drinking holds more severe medical consequences for co-infected patients and may thus be less driven by such triggers as the desire to socialize easily or to fit in with others. These findings are likely to be helpful to providers, who may wish to focus their attention on methods of coping with negative affect over responding to social triggers when dealing with HIV/HCV co-infected drinkers.

Limitations are noted. The current study was conducted in one HIV primary care clinic in New York City, with a mostly male, minority sample. Understanding the generalizability to other geographical and less urban areas, to women and other ethnic groups, and to those not in HIV treatment requires further study. Also, the current data were from an intervention trial (17), so all patients received a brief educational or motivational intervention between baseline and 60 days, which likely accounted for the overall low levels of drinking at 12 months. However, intervention condition was included as a control covariate in analyses (in order to control for differential treatment efficacy), and predictive results were found despite low levels of 12-month drinking and dependence symptomology. Yet, generalizability to patients not receiving any alcohol intervention should also be studied. Finally, HCV status was obtained from patients' medical records, and therefore may in some cases indicate an infection that has since remitted. However, this trial was conducted between 2007 and 2010, before new and increasingly effective HCV medications were introduced, and during a time when HCV medication was less efficacious for HIV/HCV co-infected patients. Further, a history of HCV (whether since remitted or not) is likely to introduce a vulnerability in liver health that may continue to influence drinking even after remission, and thus, results for co-infected patients may more broadly reflect the experience of individuals who have struggled with multiple medical concerns throughout their life. Yet, future studies should specifically assess current HCV infection to better elucidate timeframe issues.

The study also evidences many strengths, including the large trial sample, the one-year follow-up, the use of empirically validated scales, focus on an important at-risk population, and attention to differences between HIV mono-infected and HIV/HCV co-infected patients. Analyses controlled for demographics and HIV characteristics, which is important, especially as HCV co-infection differed by age, education, and duration of HIV infection. Another strength is that participants responded to all motive items, allowing any individual to endorse high levels of none, some, or all of the motives, in lieu of requiring participants to endorse only one motive when more may apply.

In sum, drinking to cope with negative affect predicted alcohol involvement as much as 12 months later among individuals with HIV alone and HIV/HCV co-infection, while social motives were only predictive among HIV mono-infected patients. Therefore, these scales, or even simple in-session questions about patients' motivations, may help identify patients most and least at risk for prolonged heavy drinking and alcohol dependence symptoms over time, which may aid in allocating intervention resources. Interventions for HIV/HCV co-

infected patients should incorporate attention to coping methods, whereas interventions for HIV mono-infected patients should attend to both coping methods and social triggers. This work enhances our ability to understand why HIV-infected patients engage in risky drinking, and how motives may differ between those with and without HCV. These findings can also facilitate detection of particularly at-risk patients, which could enhance relevance and effectiveness of clinical care.

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Key messages

Among HIV patients, drinking motives predict alcohol involvement 12 months later. For HIV mono-infected patients, drinking to cope and drinking for social reasons predict 12 month alcohol involvement. For HIV/Hepatitis C co-infected patients, coping (but not social) motives predict 12 month alcohol involvement.

Table I

Reasons for drinking and 12 month alcohol outcomes.

		Uncontrolled model (n=236)		Controlled model[a] (n=235)[b]	
Outcome	**Reason for drinking**	**Incidence Risk Ratio (95% Confidence Interval)**	**P-value**	**Incidence Risk Ratio (95% Confidence Interval)**	**P-value**
Total number of drinks at 12 months					
	Drinking to cope with negative affect	1.04 (0.78, 1.38)	0.80	1.03 (0.77, 1.38)	0.85
	Drinking for social facilitation	0.94 (0.72, 1.22)	0.64	0.96 (0.72, 1.27)	0.76
	Drinking due to social pressure	0.71 (0.51, 0.97)	0.03	0.67 (0.47, 0.94)	0.02
Alcohol dependence symptoms at 12 months					
	Drinking to cope with negative affect	1.63 (1.06, 2.50)	0.03	1.80 (1.11, 2.92)	0.02
	Drinking for social facilitation	1.17 (0.80, 1.70)	0.42	1.23 (0.82, 1.84)	0.32
	Drinking due to social pressure	1.33 (0.82, 2.15)	0.25	1.28 (0.78, 2.11)	0.33

Note. Generalized linear models each include one baseline reason for drinking as a predictor, a 12-month alcohol variable as an outcome, and specification of a negative binomial distribution.

[a]Controlled models control for intervention condition, baseline total drinks or dependence symptoms, age, sex, race, education, language of study completion, HIV medication status, and years since HIV diagnosis.

[b]One participant had missing data on some demographic/HIV covariates, leading to a reduced sample size in controlled analyses.

Table II

Reasons for drinking and 12 month alcohol outcomes: Results stratified by hepatitis C virus (HCV) co-infection status (n=234).

Outcome	Reason for drinking	HIV/HCV co-infected patients (n=72)		HIV mono-infected patients (n=162)	
		Incidence Risk Ratio (95% Confidence Interval)	P-value	Incidence Risk Ratio (95% Confidence Interval)	P-value
Total number of drinks at 12 months					
	Drinking to cope with negative affect	0.73 (0.35, 1.54)	0.41	1.09 (0.78, 1.52)	0.62
	Drinking for social facilitation	0.89 (0.48, 1.64)	0.71	0.94 (0.67, 1.30)	0.69
	Drinking due to social pressure	0.65 (0.31, 1.36)	0.25	0.61 (0.41, 0.91)	0.02
Alcohol dependence symptoms at 12 months					
	Drinking to cope with negative affect	4.75 (0.90, 25.12)	0.07	1.85 (1.08, 3.17)	0.02
	Drinking for social facilitation	0.81 (0.30, 2.16)[a]	0.67	1.56 (0.98, 2.48)	0.06
	Drinking due to social pressure	1.71 (0.52, 5.68)[a]	0.38	1.33 (0.75, 2.34)	0.33

Note. Generalized linear models each include one baseline reason for drinking as a predictor, a 12-month alcohol variable as an outcome, specification of a negative binomial distribution, and control covariates (intervention condition, baseline total drinks or dependence symptoms, age, sex, race, education, language of study completion, HIV medication status, and years since HIV diagnosis).

[a]These models exclude the race covariate due to convergence errors.