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Perceived medical risks of drinking, alcohol consumption, and hepatitis C status among heavily drinking HIV primary care patients

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Abstract

BACKGROUND—Heavy drinking poses significant risks to the health and survival of individuals infected with HIV, particularly those co-infected with hepatitis C virus (HCV). However, little is known about patients' perceptions of these risks, and whether these perceptions relate to their alcohol consumption.

METHODS—A sample of 254 heavily drinking HIV primary care patients (78% male; 94.5% minority; 31.8% with HCV) reported on their perceptions of the medical risks of drinking and on their alcohol consumption prior to participation in a drinking-reduction intervention trial.

RESULTS—In the HIV-infected sample as a whole, 62.9% reported that they had a medical problem made worse by drinking, and 64.3% reported restricting drinking to avoid future medical problems. Although patients co-infected with HIV/HCV reported greater efforts to restrict drinking to avoid future medical problems (AOR=1.94), their reported drinking quantity and frequency did not differ from that of HIV mono-infected patients. Awareness of medical risk was not associated with drinking level. Effort to restrict drinking to avoid medical risk was associated with lower drinking quantity, frequency, and binge frequency (ps<0.05), but the association with binge frequency was specific to patients *without* HCV.

CONCLUSIONS—Over one-third of HIV patients are unaware of the medical risks of drinking, and do not restrict use, suggesting the need for intervention in this group. Patients co-infected with

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HIV/HCV may report more effort to restrict drinking, but their reported drinking quantity and frequency suggest that they are actually drinking just as heavily as HIV mono-infected patients. Awareness of medical risk was unrelated to drinking, which suggests the need for interventions consisting of more than simple education. However, reported effort to restrict drinking did predict less drinking, suggesting the importance of patient commitment and initiative in change.

Keywords

HIV; alcohol; drinking; risk; hepatitis C

Introduction

Heavy drinking poses serious threats to the health and survival of individuals living with HIV. Alcohol can affect immune function, with several studies showing that heavy drinking is associated with higher viral load and lower CD4 count (Hahn and Samet, 2010). HIV-infected patients with problem drinking are also less likely to adhere to lifesaving antiretroviral therapy (ART) regimens (Azar et al., 2010), decreasing ART efficacy and increasing the risk for medication resistance (Kalichman et al., 2009). Further, liver damage is a major cause of death among those with HIV (Palella et al., 2006, Antiretroviral Therapy Cohort, 2010), resulting from multiple causes including heavy drinking, as well as ART hepatotoxicity and hepatitis C virus (HCV) co-infection (Barve et al., 2010).

Approximately 25% of HIV-infected patients are co-infected with HCV (Centers for Disease Control and Prevention, 2013). For these HIV/HCV co-infected patients, heavy drinking poses substantial risks to liver related mortality. HIV accelerates HCV-related liver damage (Curry, 2013), which is further exacerbated by heavy drinking (Barve et al., 2010). Further, HIV/HCV co-infected patients who drink heavily are often considered ineligible for HCV treatment (Maier et al., 2014, Klein et al., 2013) and are less likely to respond well to treatment if it is given (Loguercio et al., 2000, Chang et al., 2005). Therefore, ensuring that individuals with HIV—especially those co-infected with HIV/HCV—do not drink heavily should be a high priority across treatment settings.

Despite the serious health consequences of heavy drinking for individuals with HIV, only about half of providers in HIV clinics provide education to HIV-infected drinkers about these risks (Strauss et al., 2009). When providers do discuss drinking, their recommendations are variable, with some providers recommending abstention and others citing health benefits of moderate drinking (Shacham et al., 2011). Similar to other primary care settings, providers in HIV settings underutilize brief, effective drinking interventions due to skepticism regarding their efficacy, low concern about patients' drinking, and time limitations (Strauss et al., 2012, Strauss et al., 2009).

Many HIV patients may therefore be unaware of the possible medical consequences of heavy drinking. However, surprisingly few studies have addressed this issue. One qualitative study suggested that HIV clinic patients had little concern about the effect of drinking on their HIV infection (Shacham et al., 2011). However, other research showing that many patients intentionally skip ART medication when drinking (Kalichman et al., 2009, Kalichman et al., 2012, Kalichman et al., 2013) suggests that many patients are aware that

drinking while taking ART medication can lead to liver damage. Yet, skipping ART medication in favor of drinking is clearly not advisable, as this can reduce ART effectiveness and contribute to drug resistance (Kalichman et al., 2009). Given the paucity of research on HIV patients' understanding of the medical risks of heavy drinking and the relationship of such understanding to actual drinking, further research in this area is needed, especially with heavily drinking samples.

Research to date on the particularly high-risk subgroup of HIV/HCV co-infected patients suggests that most of these patients are aware that drinking can be harmful (Proeschold-Bell et al., 2010). However, whether this group adjusts their drinking accordingly is unclear, with one study suggesting that HIV/HCV co-infected patients drink less than those with HIV alone (Tsui et al., 2007) and others suggesting that they drink *more* (Bonacini, 2011, Cook et al., 2009). More research is therefore needed on risk perceptions and how they relate to drinking behavior among the high-risk subgroup of patients with HIV/HCV.

To further the research in these areas, we assessed awareness of the medical risk of drinking, efforts to restrict drinking, and how these factors relate to alcohol consumption, in a sample of HIV-infected heavy drinkers. First, we describe the full sample's awareness of the medical risks of drinking and effort to restrict drinking to avoid future medical problems. Then, we determine whether HIV-infected patients with and without HCV differ on these risk variables, and whether they differ in alcohol consumption. Next, we assess whether risk awareness and efforts to restrict drinking are associated with less drinking, and determine whether these risk/drinking associations differ by HCV status. Following these primary analyses, differences in risk awareness and efforts to restrict drinking by demographic characteristics are also explored, as well as demographic differences in the risk/drinking associations.

Materials and Methods

Participants and Procedures

Participants were HIV-infected adults from an urban northeastern HIV primary care clinic, enrolled from 2007-2010 in a randomized trial of brief drinking-reduction interventions (Hasin et al., 2013). Inclusion criteria required at least one occasion of heavy drinking (four or more drinks) in the past month. A total of 295 potentially eligible patients were referred by clinic providers to study coordinators for informed consent and eligibility screening; of those, 258 were deemed eligible and included in the trial. Of the 258 patients enrolled, four either withdrew or did not provide usable data, resulting in a final sample of 254 (Hasin et al., 2013). Data for the current study were collected via Audio Computer-Assisted Self-Interview (ACASI) in English or Spanish (patients' preference) at patients' baseline appointment, after trial enrollment and informed consent but prior to intervention exposure. The study protocol was approved by institutional review boards at Columbia University, St. Vincent's Hospital, and Mt. Sinai Medical Center.

As reported previously (Elliott et al., in press), participants were mostly in middle adulthood, male, African American or Hispanic, and English-speaking; the majority had at least graduated from high school or received a GED (see Table 1). Patients reported variable

duration of HIV infection, and most were on ART medication (Elliott et al., in press). Approximately a third (31.8%) were co-infected with HIV and hepatitis C virus (HCV). Patients typically drank 5.7 (SD = 3.5) drinks per occasion, 3-4 times per week (Elliott et al., in press). They binge drank about twice per week, drank to intoxication once per week, and consumed about 11.3 (SD = 6.4) drinks on their maximum occasion (Elliott et al., in press).

Measures

Medical risks of drinking—Two items assessed this domain. “I have a medical problem that is made worse by drinking” assessed participants’ awareness of current risk. The second item addressed restricting drinking to avoid potential future problems: “I don't drink more than I do because drinking more could cause me medical problems.” Participants responded to both items using a five-point scale of agreement ranging from “agree strongly” to “not sure” to “disagree strongly.” To aid interpretation, we dichotomized these two items, combining disagree strongly and disagree somewhat responses into one category, and agree strongly and agree somewhat responses into the other. Few patients endorsed the “not sure” option (awareness item: n=21 [8.3%]; restricting drinking item: n=12 [4.7%]). Because such responses are difficult to interpret, we excluded patients with these responses in analyses using these variables.

Alcohol consumption—Past-year drinking was measured using the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS). The AUDADIS has demonstrated good-to-excellent test-retest reliability in the U.S. general population (Grant et al., 2003), among Latino primary care patients (Canino et al., 1999), and among patients with substance use and psychiatric diagnoses (Hasin et al., 1997). Alcohol consumption assessment included typical quantity (drinks per drinking day) and maximum drinks consumed. Also included were typical frequency, frequency of binge drinking (five or more drinks on one occasion for men, four or more for women), and frequency of intoxication (defined by slurred speech, unsteadiness, blurred vision). The 11-point response options for frequency items ranged from “every day” to “never.”

Demographic and medical variables—Age, ethnicity, gender, education, language of study completion (English/Spanish), ART medication status, and years since HIV diagnosis were assessed. These variables were used as control variables in all analyses, consistent with previous research on this sample (Elliott et al., in press, Elliott et al., 2014). HCV diagnoses were obtained from laboratory results in patients’ medical records.

Analysis Plan

Descriptive analyses—First, to characterize the full sample's risk perceptions and effort to reduce risk, we summarized the proportion of patients reporting awareness of having a medical problem made worse by drinking, and the proportion reporting effort to restrict drinking to avoid future medical problems. We used a chi squared test to determine whether these two constructs were related. We then described endorsements of these items and their association in the HIV/HCV co-infected subsample.

Analyses by HCV status—To determine whether HIV/HCV co-infected patients were more aware of risk and/or more likely to restrict drinking to avoid future risk, we compared HIV mono-infected and HIV/HCV co-infected patients' responses to these items in two logistic regression models (SAS Proc Logistic (SAS Institute Inc, 2011)). Each model included HCV status as a predictor, one of the risk variables as an outcome, and the demographic and HIV control variables as covariates. The demographic control variables included age, ethnicity, gender, education, and language of study completion. The HIV control variables included ART medication status, and years since HIV diagnosis. We also compared the drinking of HIV mono-infected and HIV/HCV co-infected patients using five generalized linear models. Each model had HCV status as the main predictor, one of the five drinking variables as an outcome, and the aforementioned demographic and HIV variables as control covariates. These models took into account the non-normal (negative binomial and Poisson) distributions of the outcome variables (SAS Proc Genmod (SAS Institute Inc, 2011)).

Associations between perceived medical risk and drinking—We next determined if patients aware of the risks and reporting restriction actually drank less, using a series of generalized linear models (SAS Proc Genmod). A model was run for each drinking variable as an outcome, with the two medical risk variables as predictors, and the previously listed demographic and HIV control variables. These models again took into account the non-normal (negative binomial and Poisson) distributions of the consumption variables. We also assessed whether medical risk variables were differentially predictive of drinking for HIV-infected patients with and without HCV. This was done by repeating the last set of analyses while also including HCV and HCV-by-medical-risk interaction terms.

Exploratory post-hoc analyses: Role of demographic characteristics—Chi squared tests were used to examine the associations of the risk variables (awareness of having a medical problem made worse by drinking, effort to restrict drinking) with key demographic variables (age [dichotomized by median split], education [dichotomized by high school graduation status], gender, and ethnicity). Then, posthoc analyses were run to explore interactions between medical risk variables and key demographics in predicting the drinking outcomes (models used SAS Proc Genmod, negative binomial or Poisson distributions, with aforementioned control variables).

Results

The majority of patients, 62.9%, were aware that they had a medical problem made worse by drinking, and 64.3% reported restricting drinking because drinking could cause them medical problems. Conversely, over one third of patients were *unaware* of the risk associated with drinking, and a similar proportion made no efforts to restrict drinking despite their HIV diagnosis. The two variables were related, $X^2(1)=9.85$, $p<0.01$. Of patients who were aware (n=143), 103 (72%) reported restricting drinking to avoid future medical problems. Of those who reported restricting drinking (n=145), 103 (71%) reported awareness of a current medical problem made worse by drinking.

Among the subsample with both HIV and HCV, 67.1% were aware that they had a medical problem made worse by drinking, and most (72.4%) reported efforts to restrict drinking because drinking could cause them medical problems. Within this co-infected subsample, the two medical risk variables were *not* significantly related, $X^2(1)=2.32$, p=0.13. Although the proportion of HIV/HCV co-infected patients reporting awareness was not significantly different from that of patients with HIV alone (Table 2), a significantly greater proportion of HIV/HCV co-infected patients than HIV mono-infected patients (72.4% vs. 61.0%; Adjusted Odds Ratio [AOR]=1.94, 95% Confidence Interval [CI]: 1.00, 3.75) reported restricting drinking to avoid medical problems. There were no differences between HIV mono-infected and HIV/HCV co-infected patients in drinking quantity, frequency, maximum quantity, or binge frequency (ps>0.40; see Table 2). However, patients with HCV reported less frequent intoxication (β=−0.15, X^2=5.58, p<0.05).

Awareness of having a medical problem made worse by drinking was unrelated to alcohol consumption (*ps*>0.30; see Table 3). However, patients who reported restricting drinking to avoid medical problems did indeed drink less. These patients drank one drink less per occasion (β=−0.18, X^2 = 5.16, p<0.05), and had less frequent drinking (β=0.17, X^2=4.29, p<0.05) and binge drinking (β=0.24, X^2=11.48, p<0.001) (Table 4).

Awareness of risk was not differentially predictive of drinking for those with and without HCV (ps>0.10). Restricting drinking to avoid medical problems, although not differentially associated with most drinking measures (ps>0.30), interacted with HCV status in predicting binge drinking (β=0.35, X^2=4.88, p<0.05). Among patients *without* HCV, effort to restrict drinking was associated with less binge drinking (β=0.33, X^2=14.32, p<0.001); this was not true for HIV/HCV co-infected patients (Table 5).

Exploratory analyses indicated no differences in medical awareness or effort to restrict drinking by age, education, gender, or ethnicity (ps>0.05). However, post-hoc tests of interaction suggested that these variables might moderate the risk-drinking associations. For the drinking quantity model, effort to restrict interacted with age (p<0.05; effort to restrict only predicted quantity among young patients). For frequency, effort to restrict interacted with gender (p<0.01; effort to restrict only predicted frequency among males). For maximum quantity, both awareness of risk and effort to restrict interacted with education (ps<0.05; effort to restrict predicted maximum drinks only among high school graduates; awareness predicted maximum drinks only among those who did not graduate). For binge drinking, gender and age interacted with effort to restrict (ps<0.05; effort to restrict was only predictive for male and young patients), whereas age interacted with awareness (p<0.05; differing directions but not significant for either group). For intoxication, gender interacted with effort to restrict (p<0.01; effort to restrict only predicted intoxication for males).

Discussion

The majority of HIV-infected patients in this sample were aware that they had a medical problem made worse by drinking, and reported restricting drinking for medical reasons. The two risk items, although related, measured distinguishable constructs. Despite this awareness and effort to restrict, patients drank heavily, well beyond the inclusion criterion of one recent

heavy drinking episode. Having an additional diagnosis of HCV, for which alcohol exacerbates existing liver damage (Schiavini et al., 2006, Bini et al., 2007, Tsui et al., 2013, Marcellin et al., 2008, Benhamou et al., 1999) and limits treatment eligibility (Maier et al., 2014, Klein et al., 2013) and efficacy (Loguercio et al., 2000, Chang et al., 2005), was unrelated to awareness of having a medical problem made worse by drinking, but was associated with more effort to restrict drinking to avoid future medical problems. Although HIV/HCV co-infected patients reported less frequent intoxication, HCV status was unrelated to drinking quantity and frequency, suggesting that the actual alcohol consumption of this subgroup did not differ. Awareness of having a medical problem made worse by drinking did not deter drinking, but restricting drinking to avoid medical problems was associated with lower drinking quantity and frequency. Restricting drinking also predicted less frequent binge drinking, but only for patients *without* HCV.

The finding that the majority of HIV patients were aware of the medical risk of drinking differs from a previous study (Shacham et al., 2011), although the qualitative nature of that study prevents direct comparison. However, importantly, our study did suggest that nearly 40% of patients are *unaware* of the risk. Providers may have not discussed the risks of drinking with these patients. Not all providers educate drinkers about these risks (Strauss et al., 2009), consistent with findings of poor quality of HIV patient-provider communication among heavy drinkers compared to other groups of HIV patients (Korthuis et al., 2011). Educational discussions may not have occurred due to provider reservations about alcohol intervention (Strauss et al., 2009, Strauss et al., 2012), or patient under-reporting of drinking. Alternately, information may have been provided to the patients, but not understood or believed. In any case, this finding demonstrates the need to increase awareness of the medical risks of heavy drinking among HIV-infected heavy drinkers, which may require interventions with providers as well as with patients.

Although logically, patients who have both HIV and HCV should be more aware that they have a medical problem made worse by drinking, since they have two such conditions, this was not found in this heavily drinking sample. However, co-infected patients did report more efforts to restrict drinking to avoid future medical problems. This could indicate that co-infected patients are more attuned to *possible future* danger (e.g., restricting drinking because drinking could lead to cirrhosis), but no more likely to identify with *current* danger (e.g., not more likely to identify as currently having “a medical problem that is made worse by drinking”). Or, patients may restrict drinking because their providers had suggested this, without attributing this advice to their current diagnoses. Yet, despite the finding that co-infected patients were more likely to report restricting drinking to avoid risk, they drank similarly to those with HIV alone, according to drinking quantity, frequency, maximum quantity, and binge frequency indices. An explanation for this discrepancy may relate to co-infected patients’ reports of less frequent intoxication; this could suggest that co-infected patients who think they are restricting drinking are less likely to deem their current state as intoxicated despite similar alcohol intake. Alternately, these co-infected patients may have decreased drinking from still higher levels, and may therefore have more tolerance to intoxication. These findings, along with studies that suggest that co-infected patients drink *more* than those with HIV alone (Bonacini, 2011, Cook et al., 2009), highlight the urgent need for effective intervention for this high-risk subgroup.

Risk awareness alone was not associated with drinking, but effort to restrict drinking did predict lower drinking levels. This is consistent with the "IMB" model of behavior change, which proposes that information alone is insufficient for behavioral change; motivation and behavioral skill are also necessary (Fisher and Fisher, 1992). There were no significant interactions between the risk variables in models predicting drinking, either in the full sample or the co-infected subsample (results not presented in text). Therefore, the influence of each risk item on drinking was not determined by response on the other.

HIV/HCV patients were no more likely to restrict drinking based on risk awareness than those without HCV. This is concerning, as previous research had suggested that risk perceptions do predict drinking among HCV patients (Perzynski et al., 2011). HIV/HCV patients' attempts to restrict drinking were not associated with the same lower binge levels seen in patients without HCV. Co-infected patients are thus not only more vulnerable due to their damaged livers; they are also less likely to be successful in their efforts to restrict (binge) drinking. The reason for this finding is unclear, but could be due to behavioral characteristics of the HIV/HCV subsample (e.g., impulse control problems), as HCV co-infection is common in HIV patients with injection drug use histories (Centers for Disease Control and Prevention, 2013).

Exploratory analyses suggested several demographic moderators. Specifically, effort to restrict drinking was more consistently associated with lower reported drinking for male patients and those in younger age groups. Also, reported effort to restrict may be more predictive among high school educated patients, with awareness more predictive among those not completing high school. However, despite these signals, these exploratory analyses were conducted post-hoc and should be replicated in further research in carefully planned a priori analyses.

Study limitations are noted. The only hepatitis diagnosis considered was hepatitis C; whether findings apply to other types of hepatitis is unknown. However, HCV was chosen because it is common among those with HIV and is chronic, making typical drinking particularly relevant. Risk perceptions were assessed with single items, which may be less reliable than multi-item scales. However, as alcohol risk perceptions among patients with HIV are understudied, this study offers important early findings warranting further investigation. Data from patients who were "not sure" about medical risk (n=21) or their efforts to restrict drinking (n=12) were difficult to interpret, and therefore were not analyzed. However, since one could interpret these individuals as unaware and unengaged in efforts to restrict drinking, sensitivity analyses were also run categorizing them in this way. These analyses (coding those "not sure" about awareness as unaware, and those "not sure" about restricting as not restricting), yielded comparable results. This study used baseline data from heavily drinking HIV patients enrolled in a drinking-reduction clinical trial. This may limit generalizability to lighter drinkers. However, heavy drinkers are of the greatest public health concern due to their elevated risk for medical consequences. The trial screening/recruitment process could have also enhanced patients' awareness of their drinking, and/or motivation to decrease drinking. However, this suggests that the reported proportions of patients unaware of drinking risk and not attempting to limit drinking may be an *underestimates*, further emphasizing the need to increase awareness and motivation to decrease drinking in this

population. Finally, associations were cross-sectional. Experimental studies would be needed to make conclusions about causality.

The study also has several strengths. Heavily drinking HIV-infected patients are an important population to study, since these patients are engaging in drinking behavior that is potentially very harmful to their health. Methodology of the current study was also strong in several respects. Surveys were administered via ACASI: this audio presentation of the questions minimizes any effect of reading difficulties while also avoiding underreporting of drinking that can occur during in-person interviews with this population (Roux et al., 2011). Alcohol consumption was measured using the AUDADIS, a reliable and extensively studied measure.

These findings suggest that the majority of heavily drinking HIV-infected patients are aware of the risks associated with drinking, and make efforts to restrict drinking, but only the latter is associated with less drinking. These findings are informative for providers. The substantial minority of patients unaware of the risks of drinking is concerning, as patients should have access to risk information, and providers conveying such information should ensure that patients understand it. Providers must therefore be intentional and clear in their messages about drinking. However, patients drank heavily regardless of risk awareness, suggesting that merely increasing awareness is insufficient in itself as intervention. Yet, patients attempting to restrict drinking did drink less, suggesting that patient effort, initiative, and commitment to change are driving factors in decreasing drinking. Providers should thus elicit and encourage such commitment in alcohol interventions. Continued research on heavy drinkers with HIV is needed, in order to better understand how to enhance health and survival in this population.

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Table 1

Demographic and HIV characteristics of the sample (n=254).

	Full sample
Demographics	
Age	
% Age 21-30	5.9
% Age 31-40	14.6
% Age 41-50	51.6
% Age 51-60	25.6
% Age 61-70	2.4
Gender	
% Male	78.0
Ethnicity:	
%African American	49.6
%Hispanic	44.9
%White	5.5
Education	
% Graduated high school	58.1
Language	
% completing study in Spanish	20.9
HIV Information	
Years since HIV diagnosis	
% <10 years	38.9
% 10-20 years	38.9
% >20 years	22.2
Medication	
% on Antiretroviral medication	77.1

Table 2

Risk awareness, efforts to restrict drinking, and typical past-year drinking among HIV-infected patients with (n=80) and without (n=172) hepatitis C virus (HCV).

	Hepatitis C status		Differences between groups	
	Positive (n=80)	**Negative (n=172)**	**Logistic regression**	**Generalized linear models**
Risk perception				
I have a medical problem that is made worse by drinking (% agreed)	67.11%	61.29%	AOR=1.18 (95% Cl: 0.62, 2.25)	
I don't drink more than I do because drinking more could cause me medical problems (% agreed)	72.37%	60.98%	AOR=1.94 (95% CI: 1.00, 3.75)*	
Alcohol consumption				
Drinks per drinking day: M(SD)	5.56 (3.29)	5.71 (3.59)		β=−0.02, X^2=0.04, p=0.84
Frequency (1=never; 11=every day)[a]: M(SD)	8.78 (2.06)	8.71 (1.68)		β=−0.02, X^2=0.05, p=0.82
Maximum drinks per drinking day: M(SD)	11.24 (6.32)	11.32 (6.49)		β=0.02, X^2=0.04, p=0.85
Binge frequency (1=never; 11=every day)[a]: M(SD)	7.76 (2.67)	7.31 (2.77)		β=0.05, X^2=0.47, p=0.49
Intoxication frequency (1=never; 11=every day)[a]: M(SD)	6.40 (2.99)	6.95 (2.47)		β=−0.15, X^2=5.58, p<0.05*

Note. Two patients with missing HCV status data were omitted from these analyses. AOR=Adjusted Odds Ratio; 95% CI=95% Confidence Interval; β=beta and X^2=chi-square value from generalized linear model.

*Indicates a significant difference between patients with and without HCV, p<0.05.

[a]Frequency response options indicate: 1 = Never, 2 = 1 to 2 times in the last year, 3 = 3 to 6 times in the last year, 4 = 7 to 11 times in the last year, 5 = Once a month, 6 = 2 to 3 times a month, 7 = Once a week, 8 = 2 times a week, 9 = 3 to 4 times a week, 10 = Nearly every day, 11 = Every day.

Table 3

Typical past-year drinking patterns for HIV-infected patients aware (n=146) versus unaware (n=85) of the medical risk of alcohol consumption.

	Aware of Medical Risk (n=146)	Not Aware of Risk (n=85)	Differences between groups: Generalized linear models
Drinks per drinking day: M(SD)	5.50 (3.02)	5.88 (4.24)	β=−0.01, X^2=0.01, p=0.94
Frequency (1=never; 11=every day)[a]: M(SD)	8.73 (1.82)	8.75 (1.82)	β=−0.02, X^2=0.05, p=0.83
Maximum drinks per drinking day: M(SD)	11.11 (6.10)	11.86 (7.22)	β=−0.07, X^2=0.72, p=0.39
Binge frequency (1=never; 11=every day)[a]: M(SD)	7.46 (2.67)	7.48 (2.91)	β=−0.03, X^2=0.14, p=0.70
Intoxication frequency (1=never; 11=every day)[a]: M(SD)	6.75 (2.59)	6.89 (2.74)	β=0.04, X^2=0.38, p=0.54

Note. Twenty-three patients who indicated that they were “not sure” about medical risk (n=21), who left this item blank (n=1), or who did not report on drinking (n=1) are omitted from these analyses. There were no significant differences in drinking between groups. β=beta and X^2=chi-square value from generalized linear model.

[a]Frequency response options are scaled such that: 1 = Never, 2 = 1 to 2 times in the last year, 3 = 3 to 6 times in the last year, 4 = 7 to 11 times in the last year, 5 = Once a month, 6 = 2 to 3 times a month, 7 = Once a week, 8 = 2 times a week, 9 = 3 to 4 times a week, 10 = Nearly every day, 11 = Every day.

Table 4

Typical past-year drinking patterns for HIV-infected patients attempting to restrict drinking (n=155) and not attempting to restrict drinking (n=85) due to medical problems.

	Attempting to restrict drinking (n=155)	Not attempting to restrict drinking (n=85)	Differences between groups: Generalized linear models
Drinks per drinking day: M(SD)	5.28 (2.96)	6.32 (4.16)	β=−0.18, X^2 = 5.16, p<0.05 *
Frequency (1=never; 11=every day)[a]: M(SD)	8.57 (1.90)	9.09 (1.59)	β=0.17, X^2=4.29, p<0.05 *
Maximum drinks per drinking day: M(SD)	10.81 (6.23)	12.33 (6.64)	β=−0.13, X^2=2.83, p=0.09
Binge frequency (1=never; 11=every day)[a]: M(SD)	7.20 (2.80)	8.18 (2.32)	β=0.24, X^2=11.48, p<0.001 **
Intoxication frequency (1=never; 11=every day)[a]: M(SD)	6.65 (2.63)	7.08 (2.66)	β=0.12, X^2=3.47, p=0.06

Note. Fourteen patients who indicated that they were "not sure" about attempts to restrict drinking (n=12), who left this item blank (n=1), or who did not report on drinking (n=1) are omitted from these analyses. β=beta and X^2=chi-square value from generalized linear model.

* indicates a significant difference between individuals restricting versus not restricting drinking, at p<0.05

** indicates significance at p<0.001.

[a] Frequency response options are scaled such that: 1 = Never, 2 = 1 to 2 times in the last year, 3 = 3 to 6 times in the last year, 4 = 7 to 11 times in the last year, 5 = Once a month, 6 = 2 to 3 times a month, 7 = Once a week, 8 = 2 times a week, 9 = 3 to 4 times a week, 10 = Nearly every day, 11 = Every day.

Table 5

Differences in past-year binge drinking frequency in those attempting vs. not attempting to restrict drinking: results for subsamples of HIV-infected patients with and without hepatitis C virus (HCV).

	Attempting to restrict drinking	Not attempting to restrict drinking	Differences between groups: Generalized linear models
Binge drinking frequency (1=never; 11=every day)[a]: M(SD)			
Patients with HCV	7.83 (2.62) (n=53)	7.95 (2.58) (n=21)	β=−0.02, X^2=0.01; p=0.91
Patients without HCV	6.87 (2.85) (n=100)	8.26 (2.26) (n=62)	β=0.33, X^2=14.32, p<0.001 *

Note.

* Indicates a difference in binge drinking frequency between those attempting to restrict drinking and those not attempting to restrict drinking, p<0.001. β=beta and X^2=chi-square value from generalized linear model.

[a] Frequency response options are scaled such that: 1 = Never, 2 = 1 to 2 times in the last year, 3 = 3 to 6 times in the last year, 4 = 7 to 11 times in the last year, 5 = Once a month, 6 = 2 to 3 times a month, 7 = Once a week, 8 = 2times a week, 9 = 3 to 4 times a week, 10 = Nearly every day, 11 = Every day.