



Full length article

Differential effects of perceived stress on alcohol consumption in moderate versus heavy drinking HIV-infected women



Heidi Hutton^{a,1,*}, Catherine R. Lesko^{b,1}, Geetanjali Chander^{b,c}, Bryan Lau^b, Gary S. Wand^c, Mary E. McCaul^a

^a Department of Psychiatry and Behavioral Sciences, John Hopkins School of Medicine, United States

^b Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, United States

^c Department of Medicine, Johns Hopkins School of Medicine, United States

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ABSTRACT

Objective: To examine the association between perceived stress and subsequent alcohol use in women living with HIV.

Methods: Women (n = 338) receiving HIV care between April 2006 and July 2010 who enrolled in either a brief intervention for hazardous drinking or a cohort of non-hazardous drinkers completed a 90-day drinking and drug use history, and completed stress, depression and anxiety measures at 0, 6, and 12 months. We examined the association between perceived stress at months 0 or 6 and measures of quantity and frequency of alcohol use in months 3-6 and 9-12, respectively.

Results: The association between perceived stress and subsequent alcohol use depended on whether women were heavy or moderate drinkers at index visit. Among women reporting ≥ 7 drinks/week at index visit, high levels of perceived stress were associated with subsequent increased alcohol intake. However, among women reporting > 0 but < 7 drinks/week at index visit, high levels of perceived stress were associated with a subsequent reduction in drinking.

Conclusions: Baseline drinking status moderates the relationship between perceived stress and subsequent alcohol use. Perceived stress is an important therapeutic target in women who are heavy drinkers.

1. Introduction

Alcohol misuse is prevalent among persons living with HIV (PLWH). Estimates of heavy drinking among PLWH in care range from 8% to 27% (Crane et al., 2017; Galvan et al., 2002) compared with 7.0% estimated in the US general population (SAMHSA, 2015). Alcohol misuse is associated with myriad negative HIV-disease outcomes, including delayed initiation of antiretroviral therapy (ART), decreased adherence to ART, and decreased virologic suppression (Chander et al., 2006).

The prevalence, frequency and severity of stress and stressful events is also elevated among PLWH, particularly among women living with HIV (WLHIV). The prevalence of post-traumatic stress disorder (PTSD) is estimated to be 30% among WLHIV, more than five times higher than for HIV-uninfected women (Machtiger et al., 2012). Similarly, mental health symptoms including depression, anxiety, and suicidal ideation are 2–4 times more prevalent among WLHIV than in uninfected women (Nanni et al., 2015). Stressors can include compromised health, stigma

associated with HIV infection and with behaviors that may have led to infection, low socioeconomic status, minority status, community and interpersonal violence, and mental health concerns (including addiction, depression, trauma, and anxiety) (Tsai et al., 2015; Whetten et al., 2008). Such stressors have been shown to have deleterious effects on the mental and physical health of PLWH (Weinstein and Li, 2016). Indeed, stress has been associated with HIV disease progression and diminished effectiveness of antiretroviral therapies (Brief et al., 2004).

Among women in general, stress is considered to be a significant contributor to alcohol initiation, misuse and relapse. In US epidemiological surveys, women's alcohol use increases linearly with increases in the number of general life stressors (Keyes et al., 2011). Among women compared with men, traumatic stress is more strongly associated with past year binge drinking (consuming $\geq 4/\geq 5$ drinks per occasion women/men) and heavy drinking (consuming $> 7/ > 14$ drinks per week for women/men). Women who report a past trauma and develop PTSD are 3.5 times more likely to develop alcohol dependence than

* Corresponding author at: Department of Psychiatry and Behavioral Sciences, The John Hopkins University School of Medicine, Meyer 3-147, 600N. Wolfe St., Baltimore, MD 21287, United States.

E-mail address: hhutton@jhmi.edu (H. Hutton).

¹ These authors are first co-authors.

women who do not report past trauma (Sartor et al., 2010). Thus, heavier alcohol use may be an attempt to cope with stress in the absence of effective and adaptive coping strategies (Corbin et al., 2013).

Among PLWH, cross-sectional observation studies similarly show recent stressful events (e.g., death, assault) and particularly lifetime traumatic experiences (e.g., childhood physical or sexual abuse) are related to an increased frequency of intoxication (Pence et al., 2008). In addition to the number and frequency of stressors, the “perception” of stress too can play an important role in alcohol consumption. Perceived stress is the appraisal that stressful events exceed one’s ability to cope and has been shown to be higher among women than among men (Cohen et al., 1983). Perceived stress is also higher among PLWH than among persons without HIV infection (Williams et al., 2016) and is associated with a higher frequency of drinking days and of days of self-reported intoxication (Scott-Sheldon et al., 2013).

In these HIV studies, as in general population clinical studies, relatively little is known about the direction of the association between stress and alcohol use. Existing studies are largely cross-sectional and individuals vary considerably in their recall of number, type, and perception of stressful events. We examine here the effects of perceived stress on subsequent alcohol consumption patterns in a cohort of HIV-infected women in care. By temporally separating perceived stress and alcohol consumption, we have improved upon prior cross-sectional studies; this approach provides additional clues as to how perceived stress and alcohol consumption may be interrelated. We hypothesized that higher perceived stress would be associated with a subsequent increase in frequency and quantity of alcohol use, and that the relationship between use of alcohol and perceived stress would be cyclical.

2. Methods

2.1. Study sample

All women were receiving care in Johns Hopkins HIV Clinic between April 2006 and July 2010. Two groups of women were enrolled in this study. The first group consisted of 153 women enrolled in a randomized clinical trial (RCT) of a brief alcohol intervention (Chander et al., 2015); RCT drinking inclusion criteria were > 7 drinks per week, two or more binge occasions (≥ 4 drinks in a day) in the past 6 months, or had a cut-off score of ≥ 2 on the TWEAK (Chan et al., 1993). The brief intervention consisted of two 20-min sessions with a study therapist, approximately one month apart, and a booster phone call within two to three weeks following each session. A second group of 234 women who did not meet RCT drinking inclusion criteria were enrolled in an observational cohort study and underwent the same assessments, but did not receive any intervention. All participants received standard of care, which consisted of access to health care professionals and referrals to an on-site weekly support group or substance abuse treatment as needed.

Women were excluded if they were actively psychotic or if they had other severe mental health symptoms that would prevent participation in the study, or if they were pregnant (due to ethical considerations regarding randomization to the standard of care). All participants signed an informed consent document approved by the Johns Hopkins School of Medicine Institutional Review Board.

2.2. Data collection

At enrollment (zero months), demographic information was collected via Audio Computer-Assisted Self-Interview (ACASI). At zero, six, and twelve months, women responded via ACASI to validated measures to assess stress, anxiety and depression, including: Perceived Stress Scale (PSS; Cohen et al., 1983); Brief Symptom Inventory (BSI; Derogatis and Melisaratos, 1983), using the anxiety subscale; and Beck Depression Inventory (BDI; Beck et al., 1996). We classified women as

anxious if they scored ≥ 1.03 on the anxiety subscale of the BSI; we classified women as depressed if they scored ≥ 20 on the BDI. At each visit, women also completed a Timeline Followback (TLFB; Sobell and Sobell, 1992) with a trained interviewer to assess alcohol and illicit drug use patterns over the previous 90 days.

2.3. Analysis

To glean information about the temporal relationship between perceived stress and alcohol use, we examined the association between PSS score reported at one visit and alcohol use from 3 to 6 months subsequent. That is, we examined the association between PSS score at 0/6 months (the index visit) and alcohol use at 3-6 months and 6-12 months, respectively.

2.3.1. Exposure

We dichotomized PSS score into $\leq 14 / > 14$. This cut-off score was used to correspond to the mean PSS score among black persons in a community sample (14.7) and to slightly exceed the mean PSS score among women in the same sample (13.7) (Cohen and Williamson, 1988). In a sensitivity analysis we modeled PSS continuously and found comparable results. We report the result of models where PSS score was dichotomized for ease of interpretation and comparability with other samples.

2.3.2. Outcomes

From the TLFB, we examined four separate (but often correlated) measures of alcohol use. In the 90-day TLFB measurement period, we treated each day as a separate observation. (If a woman was in a controlled environment (CE) e.g., hospital, jail, she did not respond to alcohol questions for those days and those days were excluded from analysis.) Outcomes for each daily observation included: 1) any alcohol use; 2) binge use (≥ 4 drinks on one occasion); and 3) number of standard drinks consumed. Finally, we restricted analysis to the subset of daily observations where women reported drinking any alcohol use and examined: 4) number of drinks consumed on drinking days. Using daily observations maximizes the utility of the TLFB to control for days women were not at risk for alcohol use due to CE and allows outcomes to vary unbounded by arbitrary limits (e.g., number of drinking days per week is bounded by 0 and 7). Furthermore, this approach ensures outcomes are better approximated by established distributions (e.g., any drinking on a single day is a binomial random variable) thus allowing our reported parameter and variance estimates to be based on solid statistical theory.

2.3.3. Covariate adjustment

To isolate the association between PSS score and alcohol use, we adjusted analyses using inverse probability weighting, a semiparametric extension of direct standardization (Hernan and Robins, 2016). We estimated the denominator of the weights using logistic regression to obtain the probability of PSS score > 14 conditional on age, black race, high school or greater education, income below \$5000, detectable viral load at baseline visit, cocaine or heroin use in the prior 3 months, depression, anxiety and randomization to the intervention for reducing hazardous drinking. We stabilized weights by the marginal probability of PSS score > 14 or PSS score ≤ 14 corresponding to the PSS score that women reported in each period.

2.3.4. Statistical model

We modeled the presence or absence of drinking and of binge drinking using log-binomial regression to obtain risk ratios. We modeled the number of drinks per day using negative binomial regression to obtain rate ratios allowing for possible over-dispersion of the data (both in the set of all days in the follow-up period to estimate drinks/day, and in the restricted set of days where women reported any drinking to estimate drinks/drinking day). We estimated parameters for all models

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