

At-Risk Drinking and Injection and Sexual Risk Behaviors of HIV-Positive Injection Drug Users Entering Drug Treatment in New York City

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Abstract

We analyzed data from 1253 HIV-positive injection drug users (IDUs) entering detoxification or methadone maintenance treatment in New York City between 1990 and 2004 to assess HIV risk behaviors and their association with at-risk drinking (defined as more than 14 drinks per week for males or 7 drinks per week for females) and intoxication. Most (81%) of the participants were male, 50% were Hispanic, and 36% African American. The average age of respondents was 40 years. Injection risk behaviors that were examined were distributive sharing of needles/syringes and distributive sharing of needles/syringes with multiple IDUs. Sexual risk behaviors included multiple sex partners, engaging in unprotected sex, and among women, engaging in trade sex. After adjusting for the effects of other variables, at-risk drinking among cocaine injectors was associated with distributive sharing of needles/syringes. At-risk drinkers were also more likely to engage in unprotected sex with a casual partner. Finally, among cocaine injectors alcohol intoxication during the most recent sex episode was associated with unprotected sex with a casual partner. These observations indicate that among HIV-positive IDUs at-risk drinking is associated with higher rates of injection and sexual risk behaviors and that alcohol intoxication is related to unprotected sex.

Introduction

INJECTION DRUG USERS (IDUs) comprise a vulnerable population in the HIV/AIDS epidemic because of the efficient transmission of HIV through their primary route of drug administration. More recently researchers have also recognized the importance of sexual risk behaviors in HIV transmission among IDUs.¹⁻³ Although HIV-positive IDUs are reported to reduce both their injection and sexual risk behaviors, some factors are associated with continued risk behaviors.^{4,5}

Risk behaviors among IDUs have also been associated with at-risk drinking and intoxication.⁶⁻⁸ However, to our knowledge, no such association has been reported for either injection risk behaviors or sexual risk behaviors among HIV-positive IDUs. We undertook the study reported here to assess whether at-risk drinking and intoxication are associated with injection and sexual risk behaviors among HIV-positive IDUs. The results were obtained as part of an ongoing study of HIV risk behaviors among drug users entering detoxification and methadone maintenance treatment in New York City.

Methods

Design and recruitment

Self-reported risk behaviors and serologic data were collected from cross-sectional samples of new admissions to the Detoxification and Methadone Maintenance Treatment Program (MMTP) of Beth Israel Medical Center in New York City between 1990 and 2004. To be eligible participants had to be newly admitted, at least 18 years of age, had injected drugs within the 6 months prior to the interview, and had not participated in the study in the previous 12 months. If a participant had been recruited into the study more than once, only one of the multiple interviews, selected at random, was used.

In order to recruit participants from the detoxification program, the interviewer visited the general admission wards of the program and identified patients admitted within the previous 3 days from the intake records. All eligible patients present on the ward were solicited for participation in the study. Some patients were unavailable for participation because of appointments scheduled by hospital staff. Among patients approached and eligible, willingness to participate

was over 95%. Almost half of those who refused were feeling too sick from drug withdrawal.

In order to recruit participants from MMTP, the interviewer reviewed the list of IDUs scheduled for intake at the central intake facility. Each applicant to the Beth Israel MMTP system was required to attend intake sessions at the central facility before being assigned to a clinic convenient to his/her home. The program intake process included numerous appointments with MMTP staff that stretched over several hours, interspersed with long waiting periods. Throughout the day the interviewer approached all listed IDUs in the waiting room to ask if they would participate in the study. Over 80% of eligible MMTP patients approached agreed to participate in the study. Primary reasons for study participation refusal included having other commitments or resulting from the time-consuming intake process.

After providing informed consent, study recruits were individually interviewed in private by a trained interviewer. A structured questionnaire was administered as part of the interview. Pretest counseling was provided and a separate informed consent for HIV testing was obtained. HIV testing was conducted using replicate enzyme-linked immunosorbent assay with Western blot confirmation. Only HIV-positive IDUs were included in the present article.

Measures

In addition to sociodemographic data, the questionnaire items assessed drug use, frequency of injection, pattern of drinking alcohol, and sexual risk behaviors regarding the 6 months period prior to the interview. The co-occurrence of alcohol intoxication and unprotected sex in relation to a single episode was also assessed ("Were you or your [primary/casual] opposite sex partner high on alcohol during last sex? Did you use a condom during the last sex with your [primary/casual] opposite sex partner?"). Alcohol intoxication was analyzed as an ordinal variable, indicating whether both partners (i.e., respondent and his/her sex partner), only one partner, or none were intoxicated during the most recent sex episode.

We used the pattern of alcohol use during the 6 months prior to the interview to identify at-risk drinking. According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA) guidelines for physicians, men who drink more than 4 standard drinks in a day (or more than 14 per week) and women who drink more than 2 in a day (or more than 7 drinks per week) are at increased risk for alcohol-related problems.^{9,10} We used the above criteria to classify males who had more than 14 drinks and women who had more than 7 drinks in a typical week during the prior 6 months as at-risk-drinkers. Alcohol consumption was assessed by asking the participants, "In a typical week during the last 6 months, how many (mugs/cans [12 ounces] of beer)/(glasses [4 ounces] of wine)/(shots [1.5 ounces] of hard liquor) did you have?" Those who had no drinks in a typical week, or had fewer drinks than the at-risk drinking level were classified as non-/moderate drinkers. Sexual behavior was assessed regarding number of opposite sex partners, frequency of sexual activity and amount of unprotected sex, each separately by partner type (i.e., primary, casual, and commercial). Primary partner was defined as a regular steady partner of the opposite sex, commercial client as a person of the opposite sex who ex-

changed drugs, money, or other goods for sex, and casual partner as an opposite sex partner other than a primary partner or commercial client. Analyses of sexual activity and risk with commercial clients (i.e., trade sex) were confined to women, because among those with opposite sex clients women comprise the overwhelming majority of commercial sex workers and because this is more consistent with the measurement of trade sex in other studies. Both drug use and sexual activity were measured on a 7-point frequency scale ranging from "less than once a month" to "10 or more times a day, almost every day." Risky sex was assessed by the proportion of times condoms/female condoms were used during sexual activity on a 5-point frequency scale ranging from "never" to "always."

Because this range of data produced sparse cells in the multivariate analyses, we analyzed drug use and sexual risk behaviors as dichotomous variables, indicating whether or not risk had occurred.

We used CD4 cell counts of less than 200 to classify such IDUs as "low CD4," because these levels are associated with reduced risk behaviors.¹¹ Also, awareness of one's HIV status prior to the risk assessment time period (i.e., the 6-month period prior to the interview) might have affected risk behaviors.¹¹ So, we defined "recent HIV-positive" IDUs as those who either reported no previous HIV-positive test result or reported their first HIV-positive test result in the 6-month period prior to the interview. Finally, the total period of the study was divided into three 5-year periods to allow for the assessment of potential changes across time.

Statistical analyses

We used the χ^2 test to assess the overall differences in categorical variables and the Cochran-Armitage test for trend to analyze binomial outcomes across ordinal explanatory variables. To further examine the association between alcohol consumption and intoxication with the risk behaviors we used multivariate logistic regression. We modeled the relationship between a single sex risk behavior as the dependent variable and the alcohol use or intoxication as the explanatory variable to obtain adjusted odds ratios (AOR) and 95% confidence intervals (CI) controlling for all theoretically important covariates. Time period, gender, and race/ethnicity, low CD4, and recent HIV-positive status were included in multivariate models as covariates. Because injecting cocaine has been associated with injection and sexual risk behaviors it was also included in the models.¹²⁻¹⁴ Interactions of each of the covariates with the alcohol use and intoxication were also examined to detect any modification of the relationship between alcohol and sexual risk behavior by one or more of the covariates. All analyses were carried out using SAS software, version 9 (SAS Institute, Inc., Cary, NC).

Results

Sample characteristics

Our sample comprised 1253 HIV-positive IDUs from the detoxification program and MMTP. Overall, 81% of the study participants were male, 50% Hispanic, and 36% African American. The average age of respondents was 40 years. Almost all IDUs (99.7%) injected one or more of the following drugs: heroin (81% of all IDUs), cocaine (57% of all IDUs), and

TABLE 1. SOCIODEMOGRAPHICS CHARACTERISTICS AND DRUG USE AMONG AT-RISK DRINKERS VS. NON-MODERATE DRINKERS

	Non-moderate drinkers n (%)	At-risk drinkers n (%)
Total	809 (100)	444 (100)
Average age (SD)	39 (7)	40 (6)
Gender		
Male	650 (80)	361 (81)
Race/ethnicity ^a		
African American	231 (29)	219 (49)
Hispanic	441 (55)	185 (42)
White	132 (16)	38 (9)
Injected heroin	658 (81)	357 (80)
Injected cocaine ^a	430 (53)	290 (65)
Injected speedball ^a	549 (68)	349 (79)

^a*p* < 0.001.
SD, standard deviation.

the combination of the two (72% of all IDUs). At-risk-drinking was prevalent (35% of all IDUs). Table 1 presents the comparisons of demographic and drug use characteristics of the sample across levels of alcohol use.

Injection and sexual risk behaviors

Using condoms during the last sex episode varied significantly by the number of intoxicated partners. When both the IDUs and their primary partners were intoxicated only 49% of the IDUs reported using a condom, compared to 53% of IDUs reporting one partner being intoxicated and 59% of the IDUs reporting no intoxication (Cochran-Armitage trend test *Z* = 1.8, *p* < 0.05). Similarly, when both the IDUs and their casual partners were intoxicated 61% reported using a condom, compared to 77% of IDUs reporting one partner being intoxicated and 76% reporting no intoxication (Cochran-Armitage trend test *Z* = 2.0, *p* < 0.05).

All risk behaviors that were examined over the 6-month period prior to the interview were also significantly more prevalent in at-risk drinkers compared to non-/moderate drinkers. Distributive sharing of needles/syringes was reported by 39% of at-risk drinkers, compared to 26% of non-/moderate drinkers (*p* < 0.001). Distributive sharing of needles/syringes with multiple IDUs was reported by 53% of at-risk drinkers, compared to 43% of non-/moderate drinkers (*p* = 0.07). Multiple sex partners were reported by 34% of at-risk drinkers, compared to 26% of non-/moderate drinkers (*p* < 0.01). Among those reporting sex with a primary partner, unprotected sex with a primary partner was reported by 58% of at-risk drinkers, compared to 49% of non-/moderate drinkers (*p* < 0.05). Among those reporting sex with a casual partner, unprotected sex with a casual partner was reported by 43% of at-risk drinkers, compared to 30% of non-/moderate drinkers (*p* < 0.05). Trade sex was reported by 26% of at-risk drinkers, compared to 16% of non-/moderate drinkers (*p* < 0.07). Table 2 presents injection and sexual risk behaviors of HIV-positive IDUs by 5-year periods (data for using condoms during the last sex were only available from a single 5-year period and was not broken down by period) within each level of alcohol use. We observed significant

TABLE 2. RISK BEHAVIORS BY FIVE-YEAR PERIODS WITHIN EACH LEVEL OF DRINKING

	Non-moderate drinkers n (%)	At-risk drinkers n (%)
Distributive sharing of needles/syringes		
1990–1994	119 (38) ^a	107 (50) ^a
1995–1999	31 (17)	25 (30)
2000–2004	21 (13)	10 (16)
Distributive sharing of needles/syringes w/multiple IDUs		
1990–1994	54 (45)	62 (58) ^b
1995–1999	12 (39)	10 (40)
2000–2004	7 (33)	3 (30)
Multiple sex partners		
1990–1994	101 (29) ^c	95 (39) ^b
1995–1999	66 (26)	31 (26)
2000–2004	41 (19)	24 (30)
Unprotected sex with primary partner		
1990–1994	94 (57) ^b	68 (59)
1995–1999	58 (42)	36 (59)
2000–2004	44 (45)	23 (52)
Unprotected sex with casual partner		
1990–1994	23 (32)	44 (51) ^b
1995–1999	15 (32)	11 (33)
2000–2004	11 (24)	6 (29)
Trade sex		
1990–1994	17 (25) ^c	12 (29)
1995–1999	6 (13)	3 (13)
2000–2004	2 (5)	6 (33)

Notes: Comparisons are within level of drinking across 5-year periods for each risk behavior.

^a*p* < 0.001.

^b*p* < 0.05.

^c*p* < 0.01.

IDUs, injection drug users.

changes in the proportions reporting some risk behaviors over the time periods. Distributive sharing of used needles/syringes and having multiple sex partners decreased over the 5-year time periods among both non-/moderate drinkers and at-risk drinkers. Unprotected sex with a primary partner and trade sex (i.e., sex with commercial clients) decreased over time periods only among non-/moderate drinkers.

Distributive sharing of needles/syringes with multiple IDUs and unprotected sex with a casual partner decreased over time periods only among at-risk drinkers.

Multivariate models were fit for the association of the outcome variables (i.e., injection and sexual risk behaviors) with at-risk drinking. To account for the effects of theoretically important covariates, we adjusted the models by including time period, gender, race/ethnicity, low CD4, and recent HIV-positive status.

After adjusting for the effect of covariates, the level of alcohol intoxication was not significantly associated with using condoms with a primary partner during the last sex episode. A significant effect of the level of alcohol intoxication among cocaine injectors was observed for using a condom with a casual sex partner during the last sex episode (Table 3).

TABLE 3. MULTIVARIATE ADJUSTED ODDS RATIOS WITH NINETY-FIVE PERCENT CONFIDENCE INTERVALS OF THE ASSOCIATIONS OF ALCOHOL USE AND RISK BEHAVIORS

<i>Levels of alcohol use intoxication and interactions</i>	<i>AOR (95% CI) Risk behavior (partner type)</i>
At-risk drinking vs. non/moderate drinking among cocaine injectors	Distributive sharing of needles/syringes 1.8 (1.3–2.5) ^a
Cocaine injectors vs. non-injectors among at-risk drinkers	2.6 (1.7–4.0) ^a
At-risk drinking and cocaine injection vs. non/moderate drinking and non-cocaine injectors	2.5 (2.0–3.2) ^a
At-risk drinking vs. non/moderate drinking	Unprotected sex (casual partner)
Both partners intoxicated vs. non intoxication among cocaine injectors	2.0 (1.3–3.0) ^a
Both partners intoxicated and cocaine injector vs. no intoxication and non-cocaine injector	2.9 (1.3–6.4) ^a
	2.3 (1.7–3.0) ^a

Note: odds ratios were adjusted for time-period, gender, race/ethnicity, low CD4 count, recent HIV-positive status, smoking crack cocaine and cocaine injection.

^a $p < 0.05$.

AOR, adjusted odds ratio; CI, confidence interval.

Among the risk behaviors examined over the 6-month period prior to the interview, distributive sharing of needles/syringes, and unprotected sex with a casual partner were significantly associated with the level of alcohol use or with the interaction of alcohol use and one of the covariates. Results from these multivariate models are presented in Table 3.

Discussion

There are several limitations to the finding of our study. First, we did not measure the frequency of binge drinking among our subjects, and it is possible that binge drinking may underlie the associations between at-risk drinking and HIV risk behaviors that we observed. Second, our dichotomous measures of alcohol consumption and intoxication do not allow us to examine a dose-response relationship between alcohol use and intoxication and risk behaviors. On the other hand, using a continuous measure of alcohol use might obscure some of the differences in risk behaviors that are observed across dichotomous measures. For instance, in assessing the association of risk and intoxication during the last sex episode, using the number of drinks as a measure of intoxication, instead of using self-reported intoxication, might mask the individual differences (e.g., total volume of blood, and alcohol tolerance) that contribute to the psychopharmacologic effect of alcohol. Third, our results are subject to the limitations of cross-sectional studies that prevent us from inferring a causal relationship between alcohol use and intoxication with risk behaviors. Fourth, we have used a between-subject, rather than a within-subject design. Therefore, our finding of an overall association of at-risk drinking and risk behaviors might reflect the effect of an extraneous variable that accounts for both at-risk drinking and the associated risk behavior. Regardless of the true nature of the relationship between alcohol use and intoxication with risk behaviors our results can be useful in tailoring HIV prevention programs more specifically to address the needs of at-risk drinking HIV-positive IDUs.

Our results indicate that at-risk drinking and intoxication, alone or in combination with injecting cocaine and time-period of the study, are associated with continued risk

behaviors among HIV-positive IDUs. These results have important implications for HIV prevention. Reducing HIV transmission among IDUs and between IDUs and their non-injecting sexual partners is closely linked to decreasing injection and sexual risk behaviors of HIV-positive IDUs.

Similar to previous studies that have shown decreased risk behaviors among HIV-positives, our sample of HIV-positive IDUs had a lower rate of risk behaviors compared to a sample of HIV-negative IDUs recruited from the same period and drug treatment programs (data not shown).^{4,5} However, we found that at-risk drinking, HIV-positive IDUs had significantly greater rates of risk behaviors than non-/moderate drinking, HIV-positive IDUs.

At-risk drinking cocaine injectors, compared to non-/moderate drinking noncocaine injectors, were more likely to lend their used needles/syringes to others. Among cocaine injectors, at-risk drinking, in comparison to non-/moderate drinking, was associated with greater likelihood of distributive sharing. Previous studies have reported a strong association between injecting cocaine and HIV risk, including high-risk needle sharing.^{13,14} Our results indicate that at-risk drinking interacts with cocaine injection and its effect is observed even when the presumably greater injection risk associated with cocaine is present.

At-risk drinkers, compared to non-/moderate drinkers, were more likely to engage in unprotected sex with a casual sex partner. This finding is similar to those reported in the IDU population, in general, which indicate an association of at-risk drinking with unprotected sex with a casual partner, but not with a primary partner.^{6,15} Although in univariate analyses at-risk drinking was associated with reporting multiple sex partners, after adjusting for the effect of covariates the effect was not significant. When we compared the multivariate models we observed that including the effect of smoking crack cocaine in the model accounted for the variance (and, thus, the significant effect) that was previous attributed to at-risk drinking.

Among cocaine injectors IDUs who reported both they and their casual sex partners were intoxicated the last time they had sex were less likely to use condoms, compared to those

who were not intoxicated. Also, cocaine injectors who reported both they and their casual sex partners were intoxicated the last time they had sex were less likely to use condoms, compared to noncocaine injectors who reported no intoxication. We had previously reported an association of intoxication of both partners with unprotected sex.⁶ However, no interaction between injecting cocaine and intoxication was previously observed.

These findings suggest at-risk drinking and intoxication continue to be associated with higher rates of injection and sexual risk behaviors among HIV-positive IDUs. Other researchers have pointed out that alcohol users are likely to benefit from HIV prevention programs that are specifically tailored for them.¹⁶ Moreover, HIV-positive IDUs are also likely to be infected with hepatitis C virus. Therefore, HIV prevention programs that address at-risk drinking and intoxication would be useful for IDUs and their sexual partners, and can help reduce the effects of liver disease among IDUs infected with hepatitis C virus.^{17,18}

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Author Disclosure Statement

No competing financial interests exist.

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