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The Relation of Alcohol Use to HIV-Risk Sexual Behavior Among Adults with a Severe and Persistent Mental Illness

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Abstract

The authors examined the relationship between alcohol use and HIV-risk sexual behavior and tested whether alcohol use immediately prior to sex is related to decreased condom use. The participants were 159 adults living with a severe and persistent mental illness. Each participated in a structured interview to assess all sexual and drug-use behavior over a 3-month period. Analysis of 3,026 sexual behaviors reported by 123 sexually active participants indicated that at the global level participants who drank more heavily were more likely to have engaged in sexual risk behavior. At the event level, however, alcohol use was not related to condom use during vaginal or anal intercourse; that is, participants who used condoms when sober tended to use them to the same extent when drinking.

It is widely believed that people engage in more reckless sexual behavior after drinking alcohol. However, the evidence for this belief is mixed, and the nature of the alcohol-risky sex relationship remains poorly understood (Leigh & Stall, 1993). One prominent framework for studying the relationship of alcohol to social behavior is the alcohol myopia model (Steele & Josephs, 1990), which proposes that alcohol intoxication leads to diminished ability to attend to distal cues and increased attention to proximal cues. In the case of sexual behavior, cues for condom use would typically be more distal compared to the immediate pleasure of sexual contact. Steele and Josephs propose that the severity of the myopia effect is related to the amount of alcohol consumed.

Researchers have studied the association between alcohol use and sexual risk behavior using three assessment methods. With the global assessment method, participants report their substance use as well as the number of times they engaged in HIV-risk behaviors during a reporting period. Studies using this method tend to find that participants who use alcohol, and those who use alcohol more heavily, are more likely to engage in risky behavior. However, the inferences that can be drawn from these studies are limited because it is not known whether sex and alcohol use occurred on the same occasions.

With the situational assessment method, participants are asked (a) whether or not they engaged in sex immediately after using alcohol (i.e., while intoxicated), and (b) about their sexual risk behavior. Responses to these two questions are then correlated. A positive association in a typical situational association study indicates that people who have had sex under the influence at least once engages in more risky sexual behavior than someone who has not. For example, Valdiserri et al. (1988) surveyed gay and bisexual men and found that participants who were “high” (i.e., used alcohol or drugs) during sex with more than half of their partners were less likely to have used condoms overall. Studies such as this provide more specific information than studies using global assessments of alcohol use and sexual behavior, but they do not

examine specific sexual events in sufficient detail to provide strong evidence regarding an alcohol-risky sex association -- it can not be determined if the risky sexual behavior occurred when the participant was intoxicated. For a detailed review of situational association studies, see Leigh and Stall (1993).

The third method involves a within-subject analysis of a multiple sexual events and includes data on whether a condom was used and whether alcohol was consumed prior to each event. This multiple-event assessment allows a comparison of each participant's sexual behavior under the influence of alcohol to their behavior when not drinking, the most direct evaluation of the effects of alcohol use on sexual risk behavior. However, only two published studies have used the multiple event assessment approach and within-subject analyses.

Fortenberry, Orr, Katz, Brizendine, and Blythe (1997) had 82 adolescent girls complete diaries of their sexual activity for 3 months. For each sexual encounter, participants recorded whether (a) their partner was different from the preceding event, (b) a condom had been used, and (c) whether alcohol or other drugs were used. Twenty-two participants reported having sex after substance use. Within-subject analysis indicated that event-specific condom use was associated with participants' usual pattern of condom use, but not with whether the current partner was different from the preceding episode or whether drugs or alcohol were used prior to intercourse. Leigh (1993) studied 90 adults, also using a diary. Between-subjects analyses revealed a positive correlation between combining sex with alcohol and unsafe sex. However, within-subject analyses for the 26 participants who had sex both with and without alcohol revealed that neither men nor women were more likely to have unprotected sex when drinking.

Because both Fortenberry et al. (1997) and Leigh (1993) used contemporaneous diary assessments of sexual behavior, we wondered whether this methodological approach may have influenced their findings. Diary assessments require that participants record their behavior during the course of the study, a procedure that may lead to behavior change due to assessment reactivity (Nelson & Hayes, 1981). Thus, the use of a diary may have influenced patterns of behavior and obscured an event-level relationship between alcohol and condom use.

We sought to design an event-level study without the reactivity associated with use of a diary. We assessed sexual behavior and substance use with the timeline followback method (TLFB; Sobell & Sobell, 1996) to obtain multiple event data for each participant. In addition to minimizing the potential for assessment reactivity, the TLFB approach is a well-established method that requires less participant effort than does daily self-monitoring. We also sampled adults with a severe and persistent mental illness (SPMI; e.g., schizophrenia) because they are more likely than adults in the general population to abuse and become dependent on substances (Regier et al., 1990) and to be infected with HIV (Carey, Weinhardt, & Carey, 1995). In this population, the influence of alcohol use on sexual behavior has been examined directly in only a few studies, and confidence in these studies is attenuated because they used global and situational assessment. Thus, it is not known if risky sexual behavior occurred when participants were intoxicated. An event-level study would provide more precise information regarding this question.

We tested five hypotheses that were guided by the alcohol myopia model (Steele & Josephs, 1990) and by previous research. Because Steele and Josephs proposed that the myopia effect is linear, we began by examining condom use during sexual episodes that occurred after binge drinking. We predicted that (a) condom use would be less likely during intercourse after binge drinking compared to intercourse that occurs when no alcohol has been consumed; (b) condom use would be less likely after any alcohol consumption compared to when no alcohol is consumed; (c) because men have more direct control over condom use (Amaro, 1995), we hypothesized that there would be a stronger negative (i.e., more pronounced) association

between alcohol and condom use for male rather than female participants; (d) because condom use is more common during sex with less well known partners overall (Laumann, Gagnon, Michael, & Michaels, 1994), we hypothesized that there would be a stronger negative association between alcohol and condom use in encounters with new sexual partners relative to encounters with casual or frequent sexual partners; and (e) alcohol use prior to sexual activity would be associated with decreased likelihood of discussion of condom use or AIDS.

In addition to testing these hypotheses, four exploratory analyses were conducted. First, because individuals with schizophrenia exhibit deficits in social cognitive processing (Penn, Corrigan, Bentall, Racenstein, & Newman, 1997), we explored whether the effects of alcohol use on condom use would be stronger for patients diagnosed with schizophrenia spectrum disorders. Second, because heavy alcohol use can impair cognitive functioning (Grant, 1987), we evaluated whether the alcohol-risky sex link differed between participants with and without an alcohol dependence disorder. Third, because global association studies suggest that marijuana and cocaine use may be related to risky sex (Chesney, Barrett, & Stall, 1998), we examined event-level relationships between condom use and substances other than alcohol. Finally, because event-level studies of alcohol use during sex have tended to focus on condom use as an isolated behavior, we examined whether alcohol use was related at the event level to the likelihood of higher-risk behaviors, such as unprotected intercourse with a new partner suspected to have risk factors for HIV infection.

Method

Participants

Participants were 159 adults who were receiving treatment for a SPMI. Patients were eligible if they reported alcohol use and sexual activity in the past year. The mean age of participants (52% male) was 37 years; 63% were European-American, 30% African-American, and 7% Other. Most were single (91%). Sixty-two percent had a high school education or equivalent, but only 17% were employed, with the remainder receiving all income from disability benefits or welfare. Most resided on their own in a private apartment (67%).

Primary diagnoses included schizophrenia (31%), schizoaffective (17%), major depressive (27%), bipolar (16%), and other psychotic disorder (9%). Eleven percent were also diagnosed with alcohol dependence, 6% with cocaine dependence, 6% with cannabis dependence, and 5% with polysubstance dependence. Twenty percent were diagnosed with either current alcohol or other drug dependence, whereas 6% were diagnosed with both. Mean Global Assessment of Functioning score was 49 (reflecting serious impairment), average number of previous psychiatric hospitalizations was 4, and 89% were taking psychiatric medications.

Measures

Demographic information—Gender, age, education, monthly income, ethnicity, and housing status were obtained with a structured interview.

Alcohol Use Disorders Identification Test (AUDIT)—The AUDIT (Babor, de la Fuente, Saunders, & Grant, 1992) contains 10 questions about alcohol consumption, symptoms of alcohol dependence, and alcohol-related problems during the past year. The AUDIT is a widely-used, reliable, and valid measure (Maisto, Carey, Carey, Gordon, & Gleason, in press). The total score ranges from 0 to 40, with higher scores suggesting more harmful drinking.

Drug Abuse Screening Test (short form, DAST-10)—The DAST-10 is a brief version of the DAST (Skinner, 1982) designed to identify drug related problems in the past year. This

measure has demonstrated good test-retest reliability (intraclass correlation coefficient [ICC] = .71) and internal consistency ($\alpha = .94$), and it discriminates between psychiatric outpatients with and without substance use disorders (Cocco & Carey, 1998).

Structured Clinical Interview for DSM-IV Axis I Disorders - Research Edition

(SCID-IV)—Psychiatric diagnoses were obtained using the psychotic, affective, and substance-use disorder modules of the SCID-IV, a standardized structured interview that has been used widely in psychiatric research (First, Spitzer, Gibbon, & Williams, 1996).

Sexual history—Participants' (a) sexual orientation, (b) number of sexual partners (past year, lifetime), (c) HIV testing history, and (d) history of sexually transmitted diseases were obtained with a structured interview.

Comprehensive Timeline Follow-Back Interview (Comprehensive TLFB)—The TLFB, a calendar-based interview, obtains self-reports of daily alcohol and substance use. Research indicates that the TLFB yields reliable and valid data (Sobell & Sobell, 1996). The Comprehensive TLFB assesses sexual behavior (Weinhardt, Carey, Maisto et al., 1998) as well as substance use and their co-occurrence.

Procedure

Screening and recruitment—During standard clinical care, patients completed the AUDIT, DAST, and a sexual risk screen. Patients who were sexually active and reported substance use during the previous year were invited to participate. Those who were interested provided written informed consent.

Assessment—Patients returned for one or two research interviews. They received \$10 for each interview. During the first interview, the SCID-IV was administered. Patients' whose primary DSM-IV diagnosis was a psychotic or major mood disorder were invited to a second interview. During the second interview, the TLFB was administered using a detailed script. Specific sexual behaviors were defined explicitly to minimize ambiguity and participants were encouraged to use terms they preferred for sexual behaviors throughout the interview (Carey, 1998). Participants were then asked to provide the initials of their sexual partners over the past three months and asked about the type of relationship with each sexual partner (new, casual or frequent)¹, and the potential risk characteristics of the partner (i.e., non-monogamous, injection drug user, HIV-infected, or a bisexual male). Next, the interviewer presented a calendar with holidays demarcated. Participants identified additional days that were memorable (e.g., trips, hospitalizations). Participants were then instructed to identify all days on which they were sexually active. To do this, participants were prompted to consider the memorable events they had recalled and to think of any patterns to their sexual encounters (e.g., weekend visits with partners). Beginning with the most recent sexual encounter, and for every sexual encounter, participants were asked a series of questions to determine (a) which partner was involved, (b) the type and number of sexual activities (i.e, barrier protected or unprotected vaginal, anal, or oral sex), and (c) whether discussion with the partner about HIV or using condoms occurred before sex. The interviewer coded participants' responses on the calendar for each sexual activity reported. The procedures used to assess sexual behavior had been used successfully in previous research (Weinhardt, Carey, Carey, & Verdecias, 1998).

¹The partner type definitions were as follows: new = sex for the first time with this person in the past 3 months, casual = sex with the person for more than a one-month period but on fewer than 5 occasions, and frequent = sex with the partner on 5 or more occasions. Although not technically mutually exclusive, partner type categories were treated hierarchically -- for example, if a partner satisfied the definitions for both new and casual, they were considered casual.

After all sexual behavior was assessed, two additional passes were made through the calendar to assess alcohol and drug use. Type and quantity (i.e., standard drinks of alcohol) of substance use were recorded by the interviewer on the calendar following standard procedures (Sobell & Sobell, 1994). For days on which the participant reported substance use and sexual behavior, the interviewer assessed whether substance use preceded sexual behavior and whether it occurred during the same part of the day (i.e., morning, afternoon, evening).

Data management and analysis—Data were double entered and checked for accuracy. To analyze the TLFB event-level data we computed log odds ratios (LOR) to represent the relationship of alcohol use to risk behavior. An odds ratio represents the likelihood of occurrence of one behavior compared to the likelihood of the occurrence of another behavior. To compute this odds ratio, a four cell (a = alcohol +, condom +; b = alcohol -, condom +; c = alcohol +, condom -; d = alcohol -, condom -) contingency table was formed based on all relevant sexual events for the participant. The ratio of primary interest was the odds of condom use under the influence of alcohol (i.e., a/c) relative to the odds of condom use when no alcohol was consumed (i.e., b/d). Thus, the odds ratio (OR) for this relationship is expressed as: $OR = (a/c) / (b/d)$. Two adjustments to this formula were necessary. First, we used the natural log of the odds because it converts the skewed odds distribution to a normal or near-normal distribution (with 0 indicating no relationship between variables). Second, we applied a standard adjustment to the formula because we expected some participants to have cell frequencies of zero. The following modification overcomes the problem of cell frequencies of zero, and does not bias the resulting LOR (Haldane, 1955): $LOR = \ln ((a+1/2)(d+1/2)) / ((b+1/2)(c+1/2))$. This value was computed for each participant based on all of his or her relevant sexual behavior and then used as the primary dependent variable, and the resulting LOR variable was then amenable to parametric statistical tests (Wickens, 1993).

Two restrictions were placed on data used in the LOR analyses. First, only vaginal and anal intercourse were included in analyses of condom use because condoms and other barriers are not used commonly for HIV prophylaxis during oral sex because the risk of HIV infection through oral-genital contact is considered to be low (e.g., Ostrow, DiFranceisco, Chmeil, Wagstaff, & Wesch, 1995). A systematic relationship between alcohol and condom use could be obscured if behavior were included for which prophylaxis is not thought necessary. Second, the primary analyses were restricted to participants who reported vaginal or anal intercourse after alcohol use and vaginal or anal intercourse without alcohol. This restriction was necessary because the relevant ratio for each participant was the odds of condom use in one condition (i.e., alcohol use) over the odds of condom use in the other condition (i.e., no alcohol use). To include participants who only had sex after alcohol use would have the effect of imputing the odds of 1 (log odds of zero) in the condom use without alcohol condition. For any individual participant in this situation, the imputed value may have been an over- or underestimate, and the LOR for such a participant would have been impossible to interpret.

LOR variables calculated for primary and exploratory analyses were distributed normally and were used in raw form. Unidirectional significance tests were used for primary analyses and bidirectional tests were used for exploratory analyses.

Results

Preliminary Analyses

Description of sexual behavior—Of the 159 participants, 123 reported vaginal, oral, or anal sexual intercourse during the previous three months. The number of participants engaging in specific sexual behaviors is summarized in Table 1.

The 123 sexually active participants reported a total of 3,026 sexual behaviors over the previous three-months. Numbers of behaviors ranged from 1 to 165 (M events per participant = 24.6, SD = 36.4, median = 11 events). Of the 3,026 reported sexual behaviors, 1,789 (59.1%) were vaginal intercourse, 1,167 (38.6%) were oral intercourse, and 70 (2.3%) were anal intercourse. Sex with frequent partners accounted for 2,619 behaviors (86.5%), whereas 265 behaviors were with new partners (8.7%) and 142 behaviors were with casual partners (4.7%). Nearly one-half (N = 1,332; 44.0%) of the behaviors occurred with partners who participants reported to have at least one of the following risk factors for HIV transmission: non-monogamy, injection drug use, HIV-infection, or being a bisexual male. Condoms were used in 36.6% of occasions of vaginal or anal intercourse with new partners, 16.8% of occasions with casual partners, and 11.4% of occasions with frequent partners. Of the sexual events with partners with at least one HIV-risk factor, over four-fifths (N = 1,134; 85.1%) were not condom or barrier protected.

Description of co-occurrence of sexual behavior and substance use—Forty-nine participants (40% of sexually active participants) reported 590 sexual behaviors occurring immediately after alcohol consumption or other substance use. Forty reported 352 events in conjunction with alcohol. Of these events, 257 (73%) were vaginal or anal intercourse. The next most frequently used substance in conjunction with sex was marijuana (288 events). Of these, 137 (48%) were vaginal or anal intercourse.

Participants also reported using cocaine during sexual activity on 14 occasions, sedatives on 6 occasions, amphetamines on 4 occasions, and hallucinogens on 1 occasion. Prior to 68 sexual events, a combination of two or more substances was used.

Global and situational associations—To assess global and situational associations between alcohol use and risky sex (i.e., in order to compare our findings with those obtained in previous studies), a HIV-risk index variable was created. Participants (n = 27) were considered to have engaged in high-risk behavior if they had at least one occasion of unprotected vaginal or anal intercourse with a new or casual partner who they suspected or knew to be non-monogamous, HIV-positive, a bisexual male, or an injection drug user, or if they had unprotected vaginal or anal intercourse with two or more partners. Participants (n = 96) were considered to be at low risk if they were sexually active but did not engage in these behaviors. Participants (n = 36) who were not sexually active during the three-month reporting period were considered to be at no risk. To conduct comparisons of greatest interest, participants at low risk and no risk were combined (n = 132), and their alcohol and drug use behavior was compared to that of the high-risk participants (n = 27).

Relative to participants at low or no risk, those who engaged in high-risk behavior (a) reported more heavy drinking days, (b) had higher AUDIT scores, (c) were more likely to have been diagnosed with a current alcohol dependence disorder, and (d) were more likely to have been diagnosed with a current substance dependence disorder other than alcohol (see Table 2). Participants who engaged in high-risk sexual behavior had a median AUDIT score of 14, above the cutpoint (13) for classifying alcohol use disorders in this population (Maisto et al., in press). Those at low or no risk had a median AUDIT score of 6. In addition, a situational association was found: participants who engaged in high-risk behavior were nearly twice as likely to have consumed alcohol in conjunction with vaginal or anal intercourse on at least one occasion, relative to participants who engaged in no high-risk behavior (44% vs. 24%; χ^2 [1, N = 123] = 9.53, p < .005).

The overall amount of sexual activity reported by the high-risk group (M number of behaviors = 17.54, SD = 18.44, Mdn = 9) was equivalent to that of other sexually active participants (M number of behaviors = 27.07, SD = 33.25, Mdn = 11; Wilcoxon's rank sum test for group

difference: $z = 0.78$, ns). The high-risk group was also equivalent to other sexually active participants on demographic variables.

Primary Analyses

Hypothesis 1. Condom use will be less likely during intercourse after binge drinking compared to when no alcohol was consumed—To determine if larger quantities of alcohol use were associated with decreased likelihood of condom use, a LOR variable was constructed using binge events (i.e., ≥ 5 drinks for men, ≥ 4 drinks for women; Wechsler, Davenport, Dowdell, Davenport, & Rimm, 1995). Twenty-three participants reported vaginal or anal intercourse with these cutoffs, and fourteen of these participants also had vaginal or anal intercourse without drinking. Using the latter participants only, the M proportion of condom use when binge drinking was 27% versus 25% when not drinking. The M LOR was -0.43 , $SD = 1.50$, which was not less than zero, $t(13) = 1.07$, ns. Thus, binge drinking before sex was not associated with condom use at the event level.

Hypothesis 2. Condom use will be less likely after drinking compared to when no alcohol is consumed—The M proportion of condom use when drinking was 28%, versus 29% when not drinking. The M LOR was 0.25 , $SD = 1.85$, which was not less than zero.²

Hypothesis 3. The association between alcohol use and condom use will be stronger among men than among women—The M proportion of condom use for women who had vaginal or anal intercourse with and without alcohol was 29% when drinking versus 35% when not drinking. The M LOR among the women was 0.43 , $SD = 2.01$, $t(13) = 0.80$, ns. The M proportion of condom use for the men who had vaginal or anal intercourse with and without alcohol was 26% when drinking versus 20% when not drinking. The M LOR among men was 0.03 , $SD = 1.26$, $t(10) = 0.05$, ns. The t -test to determine whether the M LOR was lower among men than among women was not significant, $t(23) = 0.53$.

Hypothesis 4. The relationship between alcohol use and condom use will be stronger with new partners than with casual or frequent partners—Nine participants reported having vaginal or anal intercourse with a new partner while drinking, and only three participants reported having sex with a new partner both with and without alcohol; thus the planned LOR method for testing this hypothesis could not be used. Alternative approaches were used to test for a relationship between partner type and condom use with alcohol, designed to test the same a priori hypothesis.

The first alternative was to combine events with new and casual partners into one group for this analysis. Five participants reported vaginal or anal intercourse with a new or casual partner with and without alcohol. The M LOR for alcohol and condom use during sex with new and casual partners for these six participants was 0.20 , $SD = 2.16$. The M LOR of alcohol use during sex to condom use during vaginal or anal intercourse with frequent partners in the group of 21 participants who had sex with frequent partners both with and without alcohol was 0.26 , $SD = 1.85$. Neither LOR differed from zero and they did not differ from each other.³

²For these 25 participants, the mean proportion of condom use with alcohol was 28% and 29% without alcohol. The mean difference in proportion of condom use between these was 1%, $SD = 25.4$, which was equivalent to zero (Wilcoxon's sign-rank test, $z = 0.99$). Only six participants had a lower proportion of condom protected intercourse when drinking than when sober. Ten other participants had vaginal or anal intercourse only when drinking, and their mean proportion of condom use was 33%. Five never used condoms, two always used condoms, and three used condoms inconsistently. Taken together, these summaries indicate that the LOR analysis yielded results that are equivalent to analysis using proportions of condom use: there was no within-subject association between alcohol use and condom use at the event level.

Hypothesis 5. Alcohol use before sex will be negatively associated with initiating a discussion regarding risk reduction with a partner—A new LOR variable was created by cross-classifying (a) the initiation of a discussion of HIV or condom use by (b) alcohol use prior to sex. Oral sex was included in this analysis because discussion of condom use or HIV could have preceded any type of sexual activity, and oral sex could have been chosen as a lower risk behavior as a result of such discussions. This analysis included the 31 participants that had any type of sex both with and without alcohol. The M proportion of events during which the participant initiated a discussion of HIV or condom use prior to sex was 2.2% when drinking versus 3.6% when not drinking. The M LOR was 0.57, SD = 1.84, t(30) = 1.74, ns.

Exploratory Analyses

Psychiatric diagnosis—Among participants with a schizophrenia spectrum disorder who had vaginal or anal intercourse both with and without alcohol (n = 9), the M proportion of condom use was 32% when drinking versus 42% when not drinking. The M LOR was -0.56, SD = 1.75, t(8) = 0.97, ns. Among the participants with other primary diagnoses who also had sex with and without alcohol (n = 16), the M proportion of condom use was 26% when drinking versus 21% when not drinking. The M LOR in this group was 0.71, SD = 1.79, t(15) = 0.59, ns. The difference between these groups was not significant, t(23) = 1.72.

Alcohol dependence diagnosis—Among participants with a diagnosis of alcohol dependence disorder who had vaginal or anal intercourse both with and without alcohol (n = 6) the M proportion of condom use was 30% when drinking versus 34% when not drinking. The LOR among participants with a current alcohol dependence disorder was not significantly different from zero, M = -0.53, SD = 1.56. Among those without current alcohol dependence, the M proportion of condom use was 27% when drinking versus 27% when not drinking. The M LOR among those without a current alcohol dependence disorder (n = 19) was M = 0.50, SD = 1.89. The difference between these groups was not significant, t(23) = 1.20.

Other substance use before sex and condom use—Seven of participants had vaginal or anal intercourse both with and without using marijuana. The M LOR between marijuana use and condom use was 0.92 (SD = 1.31), t(6) = 1.88, ns. Other substances were used during sex by fewer participants, and therefore equivalent analyses was not conducted.

High-risk sex and alcohol use—A new LOR variable was created for each participant by categorizing each vaginal or anal intercourse event as high-risk or low-risk. The LOR variable was then calculated by cross classifying vaginal or anal intercourse events by risk level (high or low) and by alcohol consumption (yes or no). Based on this classification, and in contrast with the condom use analysis, a positive LOR indicates increased risky behavior when using alcohol. The analysis was restricted to the 25 participants who had vaginal or anal intercourse with and without alcohol. The M proportion of behaviors that were high risk sex was 9% when drinking versus 5% when not drinking. The M LOR was 0.69, SD = 1.80. A bidirectional test comparing the M LOR to zero approached significance, t(24) = 1.92, p = 0.066. When tested by gender, this relationship was significant among women, M LOR = 1.41, SD = 0.41, t(13)

³Because of the small number of participants who had sex with a new or casual partner both with and without alcohol, the data were further investigated with other approaches. First, using a between-subjects approach, the M log odds of condom use with a new or casual partner when drinking (-0.61) was compared to the M log odds of condom use during sex with a new or casual partner when not drinking (-0.33) using an independent t-test; the result was not significant, t(46) = 0.49. Next, a chi-square test was used including vaginal or anal intercourse with the most recent new partner (i.e., such that each participant could only contribute one observation; this avoids violating a fundamental assumption of the χ^2 test for independence, Conover, 1980; p. 159), the proportions were 47% condom use with alcohol and 43% condom use without alcohol. These results appear to indicate that alcohol use prior to sex was not associated with decreased condom use.

= 3.47, $p < .005$, but not among men, $M LOR = -0.22$, $SD = 0.53$, $t(13) = 0.41$. Removing the risk status and condom use criteria and focusing on partner type alone revealed an identical pattern of results, suggesting that the above result regarding high-risk sex was an artifact of the finding that among women, sex with a new or casual partner was more likely than with a frequent partner when drinking than when sober.

Discussion

Three findings were obtained in this study. First, we found a pattern of associations between global measures of heavy alcohol consumption and sexual risk behavior among adults with a SPMI. That is, psychiatric outpatients who engaged in high-risk sexual behavior were more likely to have a current diagnosis of an alcohol or drug use disorder, and to report more heavy drinking days and higher AUDIT scores relative to participants with no high-risk sexual behavior. We also found a situational association, indicating that participants who engaged in high-risk behavior were almost twice as likely as other sexually active participants to have consumed alcohol in conjunction with vaginal or anal intercourse on at least one occasion. These global and situational associations extend results obtained from studies conducted with higher-functioning populations (e.g., Ericksen & Trocki, 1992; Kelly et al., 1991).

Second, contrary to our a priori hypotheses, we did not find an event-level relationship between alcohol use and condom use in the sample as a whole, nor among subgroups of participants in which the relationship was expected to be stronger, such as men, participants with alcohol dependence, or participants with schizophrenia-spectrum disorders. Further, we did not find an event-level relationship in subsets of sexual events in which the relationship was predicted to be more evident, such as events with less well known partners, or events during which heavy drinking occurred. Finally, alcohol use before sex was not related to decreased likelihood of discussing HIV-risk reduction with a partner.

Third, exploratory analyses indicated that women were more likely to have had sex with a new or casual partner when drinking than when sober. These results are similar to those obtained by Testa and Collins (1997) in a study of female adolescents. They asked participants to recall two sexual events: one event that involved alcohol and one that did not, and found no difference between events in the proportion of participants who used condoms. However, participants' sexual partners were more likely to have been new acquaintances in the alcohol event compared to the no-alcohol event. This association could reflect an effect of alcohol on women's ability to refuse sexual advances, or simply reflect a tendency to meet new and casual sexual partners in settings where drinking is prevalent. Because sex with new partners has the potential to result in sexual coercion, which is common among women with a SPMI (Weinhardt, Bickham, & Carey, 1999), this finding warrants further attention.

Results of our event-level analyses are consistent with the two other multiple-event studies that have conducted within-subject analyses (Fortenberry et al., 1997; Leigh, 1993), which are the only studies to compare samples of individuals' condom use behavior when drinking with their behavior when sober. Thus, none of the three studies that have examined the purported alcohol-risky sex link in this methodologically rigorous way has found supportive evidence. The findings from this and other multiple-event studies indicate that most people who use condoms when they are sober also use condoms when they have consumed alcohol.

This mixed pattern of findings -- global and situational associations in the absence of an event-level association -- challenges the view that alcohol intoxication increases sexual risk behavior due to alcohol myopia (Steele & Josephs, 1990). Results from field studies like ours also parallel recent laboratory-based experiments that provide mixed support for a causal effect of alcohol on risk behavior. Such studies suggest that alcohol expectancies influence theoretical

determinants of condom use as much as alcohol itself (Fromme, D'Amico, & Katz, 1999; Gordon, Carey, & Carey 1997). These laboratory findings indicate that an association between alcohol use during sex and condom use may be mediated cognitively.

The current findings also challenge a second explanation for global and situational associations of alcohol and risky sex: people drink when they plan to engage in sexual HIV risk behavior. McKirnan, Ostrow, and Hope (1996) argued that people may drink to escape from anxiety associated with pleasurable activities that violate social norms. According to this view, alcohol and risky sex may be associated at the global level because when people plan to engage in risk behavior they may drink or use drugs to decrease cognitive dissonance about their behavior. However, according to this argument, alcohol and risky sex should also be associated at the event level.

For a causal relationship to exist between alcohol use and sexual risk behavior, or to support the view that people drink in anticipation of risky sex, data need to indicate that alcohol use in combination with sexual activity is related to increased sexual risk during an encounter. Lacking such evidence, one could conclude that an event-level relationship between alcohol use and condom use does not exist, and reject explanations predict that alcohol use during sex will be associated with a decreased likelihood of condom use.

A potential explanation for this mixed pattern of findings may be that dispositional traits, or attitudes and beliefs function as "third variables" and explain the global associations between alcohol use and risky sex. In other words, people likely to use alcohol more heavily may also be more likely to engage in risky sexual behavior (and other health risk behaviors) because of a personality trait, or a constellation of attitudes and beliefs. Several studies have examined the relationship of personality factors to both sexual behavior and substance use. Jessor and Jessor (1977), in a classic longitudinal study, found that problem behaviors, including alcohol use and early initiation of sexual behavior, tend to cluster in the same individuals. More recent studies provide evidence consistent with this perspective. Kalichman, Heckman, and Kelly (1996) found that sensation-seeking is related to sexual risk behavior and substance use, whereas Caspi, Begg, Dickson, and Langley (1995) found that impulsivity was a strong predictor of several health risk behaviors, including sexual risk behavior and alcohol and drug abuse. However, it should be noted that although in the current study and other multiple-event studies that have conducted within-subject analysis, personality factors were not assessed, but the within-subject analyses essentially removes these factors as potential third variables.

It appears premature and potentially counterproductive to assert that drinking leads to unsafe sex, when the available data do not provide support for such an association. Moreover, there may be pitfalls to disseminating such a message. Because alcohol expectancies can be acquired vicariously and through various media (Goldman, Brown, & Christiansen, 1987), delivering a message that alcohol use causes riskier sexual behavior may have the effect of "teaching" sex-related alcohol expectancies to those who may not have previously held them, and reinforcing such expectancies where they already exist. This could have the effect of giving some people an excuse for engaging in unsafe behavior when drinking (Bolton, Vincke, Mak, & Dennehy, 1992). This is especially important given the results of laboratory studies that have highlighted the importance of sex-related alcohol expectancies (e.g., Gordon et al., 1997). A more judicious approach may be to develop intervention components that encourage participants to decrease both alcohol use and risky sexual behavior. Such programs could address situational factors that promote risk for both behaviors, such as meeting sexual partners in environments where alcohol is served. This type of intervention would reduce the opportunity for co-occurrence of the behaviors, and minimize the development of maladaptive sex-related alcohol expectancies. Another promising intervention approach may be to directly address and attempt to modify sex-related alcohol expectancies toward expectancies of less risk behavior.

When interpreting these findings, one should be mindful of their limitations. First, given the clinical context of our work, we restricted the number of constructs assessed in order to minimize respondent burden. Thus, we did not assess sex-related alcohol expectancies or other constructs that may mediate the alcohol-risky sex relationship. Second, the sample used in the primary analyses was small which reduced statistical power to detect an event-level relationship. The LOR approach allowed the most direct test of the hypotheses, but it restricted the number of participants who could be included in primary analyses. Third, measurement error associated with self-reported data may have obscured actual event-level relationships. However, we used an assessment device that included techniques to aid recall and minimize bias. Fourth, although we attempted to integrate our findings into the larger alcohol-sexual risk behavior literature, this study was conducted with a sample of people with severe mental illness. Thus, the generalizability of our findings to other populations may be limited.

Future research using multiple-event assessment might evaluate the link between alcohol and risky behavior while assessing constructs hypothesized to underlie both alcohol use and HIV-risk behavior (e.g., sex-related alcohol expectancies). Such research would be optimized by using a larger sample of sexually active and substance using participants.

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Table 1

Participants' Sexual Behavior, Drug Use, and Related Behaviors (N = 159)

Sexually Active – Past Three Months, <u>n</u> (%)	123	(77)
Vaginal Sex, <u>n</u> (%)	106	(86)
Oral Sex, <u>n</u> (%)	81	(66)
Anal Sex, <u>n</u> (%)	12	(10)
Partners – Past Three Months (<u>n</u> = 123 sexually active)		
New Partner, <u>n</u> (%)	35	(29)
Casual Partner, <u>n</u> (%)	19	(15)
Frequent Partner, <u>n</u> (%)	90	(73)
Multiple Sex Partners, <u>n</u> (%)	32	(26)
Condom Use During Vaginal/Anal Intercourse (<u>n</u> = 109)		
Never, <u>n</u> (%)	67	(62)
Inconsistent, <u>n</u> (%)	21	(20)
Always, <u>n</u> (%)	21	(20)
Substance Use Prior to Sex (<u>n</u> = 123 sexually active)		
Alcohol Use Prior to Sex, <u>n</u> (%)	40	(33)
Alcohol Use Prior to Vag/Anal Int., <u>n</u> (%)	35	(29)
Any Substance Use Prior to Sex, <u>n</u> (%)	49	(40)
Any Substance Use Prior to Vag/Anal Int., <u>n</u> (%)	43	(35)
Any High-Risk Sexual Behavior ^a , <u>n</u> (%)	27	(22)
Discussed Condoms or HIV Prior to Sex, <u>n</u> (%)	45	(37)
Initiated Discussion of Condoms or HIV, <u>n</u> (%)	28	(23)
Sexual Orientation, <u>n</u> exclusively heterosexual (%)	125	(79)
Sexually Transmitted Diseases		
Lifetime, <u>n</u> (%)	69	(43)
Past Year, <u>n</u> (%)	16	(10)

Note.

^a High-risk sexual behavior was defined as (a) unprotected vaginal or anal intercourse with a new or casual partner who the participant knew or suspected to be nonmonogamous, an injection drug user, HIV-positive, or a bisexual male, or (b) Unprotected vaginal or anal intercourse with more than one sexual partner.

Table 2
Global and Situational Associations Between Alcohol Use and Sexual HIV Risk Behavior: Past Three Months

	High Risk (<i>n</i> = 27)	Low Risk (<i>n</i> = 96)	No Risk (<i>n</i> = 36)	High Risk vs. Others
Any Alcohol Use	81.5%	69.0%	63.8%	$\chi^2(1, N = 159) = 1.90$ ***
Alcohol Use During Vaginal or Anal Intercourse	44.0%	24.0%	--	$\chi^2(1, N = 123) = 9.53$ ***
Total Standard Drinks				
	M	60.26	38.58	
	SD	166.43	67.47	
	Mdn	7.00	4.00	$z = 1.80$
Drinking Days	M	11.42	9.75	
	SD	20.63	14.97	
	Mdn	3.00	2.00	$z = 1.08$
Heavy Drinking Days	M	3.84	2.36	
	SD	11.97	6.10	
	Mdn	1.00	0.00	$z = 1.98$ *
AUDIT Score: (potential range: 0 – 40)	M	8.83	12.11	
	SD	9.23	11.49	
	Mdn	5.00	8.00	$z = 2.20$ *
DAST Score: (potential range: 0 – 10)	M	2.14	1.89	
	SD	2.95	3.11	
	Mdn	0.00	0.00	$z = 1.43$
Alcohol Dependence	M	9.4%	5.6%	$\chi^2(1, N = 159) = 6.91$ **
Other Drug Dependence	M	11.5%	5.6%	$\chi^2(1, N = 159) = 13.39$ *****
Alcohol or Drug Dependence	M	15.6%	11.1%	$\chi^2(1, N = 159) = 12.90$ *****

Note. Participants were classified as engaging in high-risk behavior if they had unprotected vaginal or anal intercourse with a new or casual partner who they knew or suspected to have a risk factor for HIV infection, or if they had unprotected VAI with more than one partner. *z* = score from Wilcoxon's rank-sum (i.e. Mann-Whitney U) test, Dependence = current dependence disorder diagnosis using DSM-IV criteria.

* $p < .05$;

** $p < .01$,

*** $p < .005$,

***** $p < .001$.