Is Substance Use a Barrier to Protected Sex Among Homeless Women? Results From Between- and Within-Subjects Event Analyses*

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ABSTRACT. Objective: This study used event-based analyses to examine how alcohol and drug use are associated with protected sex among women residing in temporary shelters in Los Angeles County. **Method:** Participants were 445 sexually active women age 18 and older who were sampled from 52 shelters serving homeless individuals. Data were collected through individual computer-assisted face-to-face structured interviews. Both between-subjects analyses ($n = 445$) and within-subjects analyses ($n = 87$) were used to examine the association between substance use and protected sex. **Results:** In both within- and between-subjects analyses, women who drank alcohol before sex were significantly more likely to engage in protected sex compared with women who did not drink alcohol. However, there was no association between women's drug use,

or their male partner's alcohol or drug use, and whether they engaged in protected sex. The higher likelihood of protected sex during events when women drank alcohol could be explained by partner choice (both analyses) and discussing condom use before sex (within-subjects analyses only).

Conclusions: These findings challenge the common belief that women's alcohol use before sex necessarily increases the likelihood of unprotected sex but are consistent with several previous studies suggesting that alcohol use may be associated with protected sex under certain conditions. Results from this study highlight the need to better understand the complexities of how alcohol use may influence the sexual behavior of impoverished women. (*J. Stud. Alcohol Drugs*, 71, 86-94, 2010)

IMPOVERISHED WOMEN OF COLOR are disproportionately affected by the HIV/AIDS epidemic, with the leading route of infection being heterosexual sex (Centers for Disease Control and Prevention, 2007). Those who are homeless may be among the most vulnerable to HIV infection, given their high rates of sexual risk behavior. Studies have estimated that 35%-50% of homeless women have multiple partnerships, 8%-19% engage in unprotected sex with high-risk partners (e.g., casual partners, partners who inject drugs), and 16%-22% trade sex (Forney et al., 2007; Kilbourne et al., 2002; Wenzel et al., 2004). Heavy drinking and drug use are also commonplace in this population. For example, a probability sample of sheltered women in Los Angeles County found that 33% drank heavily and 49% used illicit drugs in the past year (Wenzel et al., 2004). Another study of women using free food programs in San Francisco found that 53% reported heavy alcohol use and 27% engaged in crack or cocaine use in the past 30 days (Riley et al., 2007). Given the significant co-occurrence between substance use and sexual risk behavior, it might seem reasonable

to assume that alcohol or drug use by these women adversely affects their ability to engage in protected sexual intercourse. However, this assumption has not been empirically evaluated in this population. Indeed, whether substance use in some way impedes condom use is one of the most widely studied, yet unresolved issues in the field of HIV prevention.

Studies over the past 2 decades have explored this question using a variety of research designs and levels of analysis (Leigh and Stall, 1993). The most common has been global association studies, which typically ask respondents to report on their general substance use and condom use behavior over a specific period, such as the past 6 months. These studies tend to find that individuals who engage in substance use, or use more heavily, are more likely to engage in unprotected sex (Weinhardt and Carey, 2000), including among those with substance abuse disorders and/or mental illness (e.g., Scheidt and Windle, 1995; Weinhardt et al., 2001). The limitation of such studies is that they cannot determine whether substance use and unprotected sex occur on the same occasion, a necessary condition for inferring a causal link between them. Event-level studies address this limitation by examining the probability that these two behaviors co-occur during a specific sexual event. Although the event-level approach cannot establish causality, temporally pairing these two behaviors provides greater insight into whether substance use before sex decreases the likelihood that protected sex will occur. Most event-level studies use a between-sub-

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jects design in which respondents report on a single sexual episode, such as their first sexual event or most recent event (e.g., Brown and Venable, 2007). Although this approach is an improvement over global association studies, it does not eliminate the possibility that confounding personality characteristics (e.g., risk taking, impulsivity, sensation seeking) are responsible for the association. A within-subjects design addresses this limitation by asking the same respondent to report on multiple events, such as one act of protected sex and another of unprotected sex, and thus holds constant relevant individual differences. Although several diary studies have collected the multiple-event data necessary to test for both between- and within-subjects effects of substance use on condom use, few have actually reported results from both types of analyses (Weinhardt and Carey, 2000).

In general, between-subjects event analyses show that alcohol use is related to the decision to have sex and to having sex with a casual partner (Cooper, 2002). Whether drinking and other forms of substance use also increase the risk of unprotected sex is much less clear. Some research has found an association between substance use and sexual risk taking in both between- and within-subjects analyses (Cooper et al., 1994), whereas other research has found an association in between-subjects analyses, but not in within-subjects analyses, suggesting that third variables may have been responsible for the between-subjects association (Leigh, 1993). Several additional studies using only within-subjects analyses have similarly reported no association between alcohol use and condom use (Fortenberry et al., 1997; Testa and Collins, 1997; Weinhardt et al., 2001). Adding to the complexity of this literature, a few event studies have even raised the possibility that for some women, alcohol use before sex actually *increases* the likelihood that a condom will be used (Leigh, 1993; Leigh et al., 2008b; Taylor et al., 1999). This may be true for homeless women as well, if their substance use before sex is linked to contextual factors that increase the likelihood that condom use will occur.

Indeed, the mixed findings regarding substance use and protected sex may be because this association depends on the context of the sexual event. Event-level studies of substance use and sexual risk behavior have tended to focus squarely on these two behaviors rather than considering contextual factors that may be important determinants of unsafe sexual practices. The exception involves some studies examining the moderating effects of demographics and partner type, where there is converging evidence that the event-level association between drinking and condom use tends to be stronger for males than females, for younger than older individuals, and for first sexual events than subsequent events (see reviews by Halpern-Felsher et al., 1996; Leigh, 2002; Weinhardt and Carey, 2000). Examining other contextual factors is an important next step, both in terms of attempting to isolate the unique effect of substance use on sexual risk behavior, as well as identifying other contextual factors that may be im-

portant targets for HIV prevention efforts. Tortu et al. (2000) conducted one of the most comprehensive studies, examining the associations of condom use with characteristics of the two partners (e.g., age, race/ethnicity, HIV status), their relationship (e.g., length, type, closeness), and the sexual event (e.g., time, location, presence of others, whether the event was special, type of sex, alcohol or drug use). Multivariate analyses indicated that condom use was more likely among women with a casual partner, with an HIV serodiscordant partner, in situations where they did not perform oral sex on a partner, when condom use was discussed, and when they perceived greater control over condom use. A study of gay and bisexual men examined whether condom use during anal sex was associated with prior sexually transmitted disease (STD) diagnosis, HIV serostatus, substance use before sex, partner type, social setting, whether sex was expected, and whether it involved a new partner (Gilmore et al., 2002). Results indicated that condom use was more likely with casual than steady partners, and among HIV-negative men. Gathering such detailed information on the context of specific sexual events may prove quite fruitful in further understanding the associations of alcohol and drug use with condom use and other aspects of sexual behavior.

This study significantly extends the literature on substance use and protected sex in four important ways. First, it focuses on a significant at-risk population for HIV/AIDS, yet one that has been understudied in terms of examining the event-level associations between substance use and sexual risk behavior—that is, impoverished, mostly minority women living in temporary shelter settings. Second, it examines the association using both between- and within-subjects levels of analysis, afforded by the collection of data on multiple sexual events from inconsistent condom users. Third, it examines both alcohol and drug use, by both women and their partners, to gain a broader picture of how each aspect of substance use may co-occur with condom use during specific sexual events. Finally, it examines these associations in the broader context of the sexual event—including women's background characteristics and HIV-related beliefs, partner characteristics, and event characteristics—in an attempt to isolate the independent association of substance use with protected sex, as well as identify contextual factors that may be important targets for HIV prevention efforts.

Method

Participants

Participants were 445 women who were recruited for a larger study examining the social context of alcohol use and HIV risk among women living in temporary shelter settings (Wenzel, 2005). The study area was the central region of Los Angeles County, CA (approximately a 15-mile radius from downtown Los Angeles). Women were eligible for

the larger study if they were at least age 18, had vaginal or anal intercourse with a male partner in the past 6 months, spoke and understood English as their primary language, and did not have significant cognitive impairment. Individual computer-assisted face-to-face structured interviews were conducted by trained female interviewers, with interviews lasting an average of 75 minutes. Women were paid \$20 for their participation. The research protocol was approved by the institutional review board of RAND and a certificate of confidentiality was obtained from the U.S. Department of Health and Human Services to help protect participants' privacy.

We used two samples for the present analyses. The between-subjects analyses are based on the full sample of 445 women, each of whom indicated whether they used a condom during their most recent sexual event that involved vaginal or anal sex. The within-subjects analyses are based on a subsample of 87 women who were inconsistent condom users during the past 6 months and thus reported on one sexual event during which they used a male condom and one sexual event during which they did not use a male condom. Characteristics of the full sample can be found in Table 1.

Study design

Women were sampled from facilities with a simple majority of homeless residents (persons who would otherwise live on the streets or who sleep in shelters and have no place of their own to stay). Although women sampled from these facilities were not initially screened for homelessness on an individual basis, 73% of them indicated that they currently did not have a regular place to stay (e.g., own house, apartment, or room, or the home of a family member or friend) and 90% indicated that they had previously stayed in a homeless setting (e.g., mission or homeless shelter, the street) because they had no regular place to stay. Our goal was to achieve a sample of women representative of those living in the diverse array of temporary shelter settings available within Los Angeles County. Potentially eligible settings were those that provided temporary shelter: emergency shelters, transitional living facilities, detox centers, rehabilitation centers, mental health facilities, and HIV/AIDS transitional homes in the study area. We excluded facilities that limit services to persons less than 18 years old, facilities that serve only men, domestic violence shelters, single-room-occupancy and board-and-care hotels, facilities whose population was not majority homeless, and facilities whose average resident length of stay was more than 1 year. Women were drawn from 52 eligible facilities in Los Angeles County and selected by means of a stratified random sample, with shelters serving as sampling strata. A strict proportionate-to-size (PPS) stratified random sample (i.e., sampling a fixed proportion of the population from every facility) would have been overly burdensome on the larger facilities. Thus, small

TABLE 1. Descriptive statistics for study variables (full sample)

Variable	<i>M (SD)</i> or %
Characteristics of the respondent	
Age, in years	36.6 (12.1)
Race/ethnicity	
Non-Hispanic White	25.9%
African American	40.2%
Hispanic	22.8%
Asian/other	11.2%
Years of education, 12 = high school graduate	12.2 (2.2)
Pregnant or tried to get pregnant in past 6 months	16.6%
Probable alcohol disorder in past year, AUDIT-10 $\geq$ 8	32.5%
Drug abuse in past year, DAST $\geq$ 3	53.4%
Condom attitudes, range: 1-4	3.1 (0.7)
Perceived HIV susceptibility, range: 1-4	2.1 (1.3)
Number of sex partners in past 6 months	2.8 (5.9)
Characteristics of the most recent sex partner	
Type of partner	
Primary	70.5%
Casual or need-based	29.5%
First time they had sex	14.4%
Relationship length, in months	74.7 (132.4) (<i>Mdn</i> = 36)
Substance use before the most recent sexual event	
She drank alcohol	13.5%
He drank alcohol	16.4%
She used drugs	16.7%
He used drugs	15.3%
Context of the most recent sexual event	
Discussed condoms before sex	22.3%
Event was special in some way	62.3%
Sex was in a familiar place	83.8%
She anticipated having sex	74.8%
He made the first move	58.4%
She felt emotionally good	58.9%
She felt extremely aroused	44.9%
She felt pressured by partner	13.4%

Notes: *N* = 445. AUDIT = Alcohol Use Disorders Identification Test; DAST = Drug Abuse Screening Test.

departures were made from PPS and corrected with sampling weights (Elliott et al., 2006).

Study variables

Background characteristics. Demographic characteristics included age, race/ethnicity (African American, Hispanic, Asian/other, and non-Hispanic white), years of education, and whether the respondent was pregnant or tried to become pregnant in the past 6 months. We used the 10-item Drug Abuse Screening Test (DAST-10; Skinner, 1982) and the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 2001; Saunders et al., 1993) to assess past-year problems with drug and alcohol use, respectively. Scores on both of these measures were dichotomized, with a score of 3 or higher on the DAST indicating drug abuse and a score of 8 or higher on the AUDIT indicating probable alcohol use disorder.

HIV-related attitudes and sexual partnerships. Attitudes toward the condom were assessed using an 8-item scale adapted by Bogart et al. (2005) from the condom attitude

scale originally developed by Brown (1984). Each item was rated on a 4-point scale (1 = *strongly disagree* to 4 = *strongly agree*; $\alpha = .73$), with higher scores indicating more positive beliefs about condoms. Perceived susceptibility to HIV was assessed with a single item: "It would be easy for you to get the HIV infection or AIDS" (1 = *strongly disagree* to 4 = *strongly agree*; Gibson et al., 1992). Respondents also reported on the number of partners with whom they had vaginal or anal intercourse during the past 6 months.

Partner characteristics. These variables refer to the relationship between the respondent and the partner she had sex with during the specific sexual event. We asked women to indicate whether the partner was a primary partner (described as "like a husband, boyfriend, or other 'steady' partner"), casual (described as "not steady like a boyfriend or husband, but instead is more casual, like once-in-a-while, 'in the moment,' or maybe 'just for fun'"), or need-based (defined as "someone a woman has sex with because she needs money, food, a place to stay, drugs, or something else"). Among women with a primary partner, 20% of them reported being currently married. Only 4% of the most recent sex partners were need-based; therefore we combined casual and need-based partners for all analyses. Women also reported on how long they had known the partner (reported here in months) and whether the event they were reporting on was the first time they had sexual intercourse with this partner.

Context of the sexual event. In an earlier stage of this project, we conducted qualitative interviews with 28 women residing in temporary shelters to identify important contextual features of sexual events that are relevant to women's engagement in unprotected sex (see Ryan et al., 2009, for methods). Based on results from these qualitative interviews, we developed the following closed-ended questions for the present study (each coded as 0 = *no*, 1 = *yes*): Did they talk about using a condom before having sex that time; was there something different or special about this event (e.g., had not seen each other in a long time, one of them was going away for awhile, one of them had just gotten paid); did they have sex in a place that was familiar to the respondent; did the respondent think she was going to have sex that time; and did the respondent feel pressured during the event to do anything sexually that she did not want to do? Women were also asked who made the first move (0 = *respondent or mutual*, 1 = *partner only*). Additional items asked about the extent to which women felt good emotionally before they had sex and felt so physically aroused that they could not think about anything else. Both of these items were rated on a 4-point scale, which was dichotomized because of their skewed distribution (0 = *somewhat or less*, 1 = *quite a bit*).

Alcohol and drug use before the event. Respondents were asked four separate questions about whether they or their partner had drunk alcohol or used drugs within an hour or so before having sex that time (0 = *no*, 1 = *yes*). If a respondent indicated that substance use occurred, she was asked follow-

up questions about the type of alcohol that was consumed (e.g., beer, wine, distilled spirits), the approximate number of drinks that were consumed, and the type of drug that was used (marijuana, cocaine, crack, speed or methamphetamine, heroin, pain killers, sedatives, or something else).

Unprotected sex during the event. The dependent variable for the between-subjects analyses is whether the respondent had unprotected sex during the most recent time she had vaginal or anal sex. The within-subjects analyses are based on the subset of women who were inconsistent condom users during the past 6 months; they reported on an event in which they had engaged in unprotected sex and another event in which they had engaged in protected sex during the past 6 months. For the purposes of classifying events as "unprotected" versus "protected," we defined an "unprotected" event as one in which a male condom was not used at all or was used ineffectively (e.g., not worn for each act of intercourse or not worn during the entire act of intercourse).

Statistical methods

The use of a disproportionate random sampling technique and differential nonresponse rates require the use of design and nonresponse weights to represent the target population from the sample of respondents. All analyses incorporate these weights and account for the modest design effect that they induce, using the linearization method (Skinner, 1989). There is a small amount of missing data for some variables (generally <3%), which was accounted for largely by mean value imputation.

For the between-subjects analyses, we conducted a series of logistic regression analyses predicting condom use during the most recent event. The base model included the four variables assessing alcohol and drug use before sex by women and their partners, as well as demographic and other background characteristics (in order to increase comparability to the within-subjects analyses, which implicitly control for individual differences). To this base model we then added each of three sets of variables—HIV-related attitudes and sexual partnerships, relationship characteristics, and event characteristics—to examine how adjusting for each variable set affected the strength of associations between substance use and condom use. For the within-subjects analyses, we conducted a series of conditional logistic regression analyses (Breslow, 1996), analogous to the between-subjects analyses, to identify characteristics that differentiate between the two types of sexual events (protected vs. unprotected). Of the 87 women included in this analysis, 28 (32%) described the same partner in both events. The base model included the four variables assessing alcohol and drug use by women and their partners before sex. To this base model we then separately added two sets of variables: relationship characteristics and event characteristics. Note that the within-subjects analyses do not include women's demographic characteristics, or

their HIV-related attitudes and sexual partnerships, because these characteristics are assumed to not vary across the two types of sexual events.

Results

Protected sex during the most recent sexual event was reported by 29% of the 445 women. As shown in Table 1, alcohol was consumed before sex by 14% of women and 16% of partners, and drugs were used before sex by 17% of women and 15% of partners. Of women who drank alcohol ($n = 57$), they were most likely to drink distilled spirits (60%), followed by beer (36%) and wine (8%); for women whose partner drank alcohol ($n = 73$), partners were most likely to drink beer (58%), followed by distilled spirits (39%) and wine (12%). Among those who drank at some point during the event, women consumed a mean of 4.1 drinks ($SD = 4.6$, $Mdn = 2$) either before or during sex, and their partners consumed an average of 3.8 drinks ($SD = 3.7$, $Mdn = 3$) either before or during sex. Twenty-four percent of women who drank believed that their alcohol use had at least some effect on whether a condom was used; 18% of women with a drinking partner believed that their partner's alcohol use had at least some influence on condom use during the event. Of the 75 women and 69 partners who used drugs before sex, speed or methamphetamine was the drug most commonly used (women: 42%; partners: 48%), followed by marijuana (women: 27%; partners: 28%), crack (women: 25%; partners: 21%), heroin (women: 12%; partners: 7%), and cocaine (7%

each). Twenty-seven percent of women who used drugs believed that their drug use had at least some effect on whether a condom was used; a similar percentage of women (26%) with a drug-using partner believed that his drug use had at least some effect on whether a condom was used.

Between-subjects analyses

Table 2 shows results from the between-subjects analyses, using logistic regression models, predicting condom use during women's most recent sexual event. Considering only the four indicators of substance use before the event, women who drank alcohol within an hour or so of the sexual event were almost three times as likely to engage in protected sex compared with nondrinking women (odds ratio [OR] = 2.63, 95% CI [1.16, 5.95]). Condom use was not significantly associated with women's drug use or their partner's alcohol or drug use. To determine whether the association between drug use and protected sex might be stronger if we isolated the effects of hard drug use (which in the case of this sample is mainly cocaine, crack, and speed/methamphetamine), we created two dummy-coded variables: no drug use versus marijuana use only, and no drug use versus any hard drug use. Condom use was not associated with marijuana use only by women or their partners (OR = 0.88, 95% CI [0.20, 3.91] and OR = 1.23, 95% CI [0.38, 3.99], respectively), or any hard drug use by women or their partners (OR = 0.88, 95% CI [0.35, 2.25] and OR = 0.51, 95% CI [0.18, 1.44], respectively).

TABLE 2. Between-subjects logistic regression analyses predicting condom use^a

Predictor variable	Substance use only		Substance use + HIV variables		Substance use + partner variables		Substance use + event variables	
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
She used alcohol before the event	2.63	[1.16, 5.95]	2.40	[1.08, 5.33]	2.24	[0.96, 5.18]	2.93	[1.09, 7.90]
He used alcohol before the event	0.85	[0.41, 1.77]	0.95	[0.46, 1.96]	0.81	[0.38, 1.74]	0.87	[0.37, 2.06]
She used drugs before the event	0.79	[0.35, 1.77]	0.68	[0.28, 1.63]	0.67	[0.29, 1.58]	0.79	[0.31, 2.04]
He used drugs before the event	0.72	[0.32, 1.59]	0.76	[0.32, 1.85]	0.56	[0.25, 1.22]	0.59	[0.26, 1.34]
Positive condom attitudes			3.63	[2.34, 5.63]				
Perceived HIV susceptibility			0.94	[0.77, 1.15]				
No. of sex partners			1.00	[0.97, 1.03]				
Casual or need-based partner					2.59	[1.48, 4.54]		
First time they had sex					2.73	[1.34, 5.56]		
Relationship length, in months					0.996	[0.994, 0.999]		
Discussed condoms							15.96	[8.44, 30.15]
Event was special in some way							0.84	[0.48, 1.46]
Sex was in a familiar place							0.84	[0.43, 1.67]
She anticipated having sex							0.67	[0.36, 1.24]
He made first move							1.27	[0.68, 2.38]
She felt emotionally good							0.68	[0.36, 1.26]
She felt extremely aroused							0.85	[0.48, 1.52]
She felt pressured by partner							0.37	[0.14, 0.92]

Notes: Significant results are shown in **bold**. OR = odds ratio. ^aModels control for race/ethnicity, age, education, pregnancy status, Drug Abuse Screening Test score, and Alcohol Use Disorders Identification Test score.

The association between women's alcohol use and protected sex weakened somewhat but remained significant (OR = 2.40, 95% CI [1.08, 5.33]) after adding condom attitudes, perceived HIV susceptibility, and number of sex partners to the model. Of these additional variables, only having a positive attitude toward condoms was a significant predictor of engaging in protected sex. The next model shows that the association between women's alcohol and condom use weakened to nonsignificance (OR = 2.24, 95% CI [0.96, 5.18]) after controlling for partner characteristics. Compared with women who had sex with a primary partner, women were 2.6 times as likely to engage in protected sex with a casual or need-based partner. Women who were with a new partner were 2.7 times more likely to engage in protected sex compared with other women, and knowing the partner for a shorter period was also associated with a higher likelihood of having protected sex. Finally, the last column shows that the association between women's alcohol use and condom use remains significant after controlling for characteristics of the sexual event (OR = 2.93, 95% CI [1.09, 7.90]). Only two of these characteristics were associated with condom use in this multivariate model: women who discussed condoms with their partner before sex were nearly 16 times more likely to have protected sex compared with women who did not discuss condom use, and those who did not feel pressured sexually during the event were more likely to have protected sex compared with those who felt pressured by their partner. Condom use was not significantly associated with whether the event was special in some way, occurred in a familiar place, was anticipated by the woman, or was initiated by the partner only. Whether the woman felt good emotionally or was extremely aroused also did not predict condom use during the event. When all of the variables shown in Table 2 were included in the same model, women's alcohol use was

no longer significantly associated with protected sex (OR = 1.96, 95% CI [0.69, 5.51]). Positive condom attitudes (OR = 3.38, 95% CI [2.06, 5.56]), having a nonprimary partner (OR = 2.38, 95% CI [1.20, 4.75]), discussing condom use (OR = 10.92, 95% CI [5.26, 22.67]), and feeling less pressured by the partner (OR = 0.36, 95% CI [0.14, 0.95]) remained significant predictors of having protected sex during the last event. None of the covariates were associated with condom use ($p < .05$) in this final model.

Within-subjects analyses

Table 3 shows results from the within-subjects analyses, using conditional logistic regression models, predicting women's engagement in protected sex. The associations between substance use and protected sex are similar to those found in the between-subjects analyses: women who drank within an hour or so before sex were three times more likely to engage in protected sex compared with nondrinking women (OR = 3.12, 95% CI [1.11, 8.72]), but condom use was not associated with women's drug use or their partner's alcohol or drug use.

Similar to the between-subjects analyses, controlling for partner characteristics weakened the association between women's alcohol use and condom use to nonsignificance (OR = 2.02, 95% CI [0.50, 8.14]). Women having sex with a casual or need-based partner were nearly seven times more likely to engage in protected sex compared with women with a primary partner. Having sex with a new partner and relationship length did not predict condom use in the within-subjects analysis. The last column of Table 3 shows that the association between women's alcohol use and protected sex weakened to nonsignificance after controlling for characteristics of the sexual event (OR = 0.97, 95% CI [0.14, 6.84]).

TABLE 3. Within-subjects conditional logistic regression analyses predicting condom use

Predictor variable	Substance use only		Substance use + partner variables		Substance use + context variables	
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
She drank before sex	3.12	[1.11, 8.72]	2.02	[0.50, 8.14]	0.97	[0.14, 6.84]
He drank before sex	1.22	[0.52, 2.88]	0.96	[0.32, 2.86]	1.47	[0.52, 4.16]
She used drugs before sex	3.06	[0.89, 10.50]	2.93	[0.28, 30.98]	3.23	[0.93, 11.26]
He used drugs before sex	0.44	[0.16, 1.20]	0.37	[0.06, 2.23]	0.38	[0.12, 1.23]
Casual/need-based partner			6.74	[1.69, 26.86]		
First time they had sex			1.44	[0.39, 5.36]		
Relationship length, in months			0.998	[0.99, 1.00]		
Discussed condoms					8.96	[3.27, 24.58]
Special event					0.73	[0.25, 2.14]
Sex was in a familiar place					1.21	[0.30, 4.88]
She anticipated having sex					1.25	[0.37, 4.25]
He made the first move					0.59	[0.16, 2.24]
She felt emotionally good					0.48	[0.14, 1.67]
She felt extremely aroused					0.42	[0.15, 1.13]
She felt pressured by partner					0.45	[0.09, 2.26]

Notes: Significant results are shown in **bold**. OR = odds ratio.

Discussing condoms with the partner was the only event characteristic associated with condom use; women who discussed condoms before sex were nine times more likely to engage in protected sex compared with women who did not discuss condom use with their partner. Condom use was not significantly associated with whether the event was special in some way, took place in a familiar place, was anticipated by the woman, who made the first move, or any of the feelings that we examined in this analysis. When all of the variables shown in Table 3 were included in the same model, both partner type (OR = 4.69, 95% CI [1.13, 19.48]) and discussing condom use (OR = 7.84, 95% CI [2.28, 26.97]) continued to differentiate between protected and unprotected sexual events.

Discussion

Alcohol and certain types of drugs are commonly regarded as sexual disinhibitors, but it is not necessarily the case that use of these substances before a sexual event decreases an individual's likelihood of having protected sex during that event. Results from this study, in fact, suggest the opposite in the case of alcohol use among homeless women: the likelihood of protected sex was greater among women who drank before sex than those who abstained from alcohol use. This finding emerged from between-subjects analyses that temporally paired women's drinking and condom use during their most recent sexual event, as well as within-subjects analyses that focused on those women who were inconsistent condom users. In the latter case, which involved comparing the last sexual event with another recent one that differed in terms of condom use, a higher likelihood of protected sex was found for events in which women drank alcohol before sex. Because each woman reported on both types of events, a notable strength of the within-subjects analyses is that they implicitly controlled for the range of individual differences that could potentially confound this association.

The possibility that alcohol use is associated with *less* risky sex under certain conditions has received little mention in the literature. However, our results build on a small number of existing studies suggesting that this might be the case for women. A recent diary study by Leigh et al. (2008b) found that drinking was associated with increased condom use with casual partners among women only. Nonsignificant trends in the same direction have been reported in at least two other studies. An earlier diary study by Leigh (1993) focused on a small sample of inconsistent condom users who had new or occasional sex partners; among the 19 heterosexuals in the sample, there was a trend toward protected sex when drinking, particularly among women. Another study of women focused on the last three occasions of intercourse with a new partner, similarly finding a trend toward protected sex when either partner had been drinking or using drugs (Taylor et al., 1999).

What factors might account for the higher likelihood of protected sex among homeless women who drank alcohol before sex? These women may subscribe to the common belief that drinking often leads to risky sex and thus are actually more vigilant about engaging in protected sex when they are drinking. Although we did not collect information to directly address this possibility, our findings suggest that this is not the case. The majority of women who drank before sex reported that they had been drinking distilled spirits and/or had consumed multiple drinks. However, only one in four of these women believed that their drinking had some impact on whether condoms were used during sex. This is consistent with the findings of Taylor et al. (1999), where only 15% of women who engaged in substance use before sex thought that it had affected their use of condoms. Thus, there does not appear to be a general acknowledgment among substance-using women that this behavior may influence whether they use a condom. Another explanation is that women are more likely to have sex with a new or casual partner when they have been drinking alcohol (Cooper and Orcutt, 2000) and, because they recognize the risks inherent in this situation, are more likely to use a condom. Our data provide some support for this idea, particularly from the within-subjects analyses: the higher likelihood of protected sex among alcohol-using women could be explained by the fact that they were more likely to have sex with a casual partner and discuss condom use with this partner before sex. Because these women live in such a high-risk environment, they may be less likely than other women to overestimate the safety of their sex partners (Drumright et al., 2004) or to engage in unprotected sex despite their partner's high-risk status (Dublin et al., 1992).

Studies of substance use and unprotected sex tend to focus primarily on the role of alcohol use; measures of drug use are less commonly included. In this study we examined both, finding that neither women's drug use nor their partner's alcohol or drug use was associated with whether they engaged in protected sex. Given that 15% of women and 17% of partners engaged in drug use before sex, this effect is not because few engaged in this behavior. Further, it was not the case that users avoided crack and methamphetamine, which are among the drugs most closely associated with high-risk sex (e.g., Edlin et al., 1994; Leigh et al., 2008a). Even after differentiating marijuana use from hard drug use, neither women's drug use nor the partners' drug use was associated with the likelihood of protected sex. Although other event-level studies have similarly found no association between drug use before sex and condom use (Tortu et al., 2000; Venable et al., 2004), there has been some inconsistency in the literature (e.g., Clutterbuck et al., 2001; Leigh et al., 2008a). As is the case for alcohol use, it is necessary to better understand the conditions under which drug use is associated with unprotected sex and the conditions under which it is not.

Finally, a goal of this study was to examine the context of sexual events to identify factors that may be important to target in HIV prevention efforts for this vulnerable population of homeless women. In addition to partner characteristics, we examined whether condoms were discussed, the event was special in some way, sex was in a familiar place and was anticipated by the woman, her partner made the first move (which may reflect a power differential during the event), and she felt certain positive or negative feelings at the time of the event. With the exception of partner characteristics and whether condoms were discussed, we did not find consistent evidence across analyses that other contextual factors made a significant difference in terms of condom use. This is very similar to the findings of previous studies that have gathered this type of contextual information (e.g., Gilmore et al., 2002; Tortu et al., 2000). Together, these findings suggest that prevention programs that focus primarily on issues related to partner selection and fostering condom negotiation skills may target the most important factors for encouraging condom use, including among homeless and other impoverished women.

Notable strengths of this study include the large probability-based sample of women living in temporary shelters, the use of multiple analytic strategies to examine the event-level associations between substance use and condom use, and the ability to differentiate between alcohol use and drug use by women and their partners. Nonetheless, results from this study may not generalize to other types of homeless women (e.g., homeless women living on the streets) or women in other geographic areas. It was not feasible to interview the male partners of these women; thus, it is a limitation that our findings are based exclusively on the women's reports of substance use, relationship and event characteristics, and condom use during the specific sexual event. Finally, given that the information in this study is based on self-report data, it is subject to the usual concerns regarding validity (e.g., social desirability biases may result in overreporting of condom use and underreporting of substance use).

Results from this study challenge the common belief that women's alcohol use before sex necessarily increases their likelihood of unprotected sex. In the case of homeless women, it appears that drinking before sex increases the likelihood of protected sex because these events are more likely to involve a casual partner and (perhaps because women recognize the risks associated with casual sex) discussion of condom use with the partner before sex. Given that most event analyses use a between-subjects design, it is important to emphasize that the within-subjects analyses provided the strongest evidence of this, highlighting the importance of using multiple methodologies to better understand the complexities of how alcohol use is associated with women's sexual behavior. Although there is limited evidence from previous studies that these findings may not be unique to homeless women, an important direction for future research

is to determine the extent to which these findings generalize to other populations.

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